EARLY PROTECTIVE AND ADVERSE EXPERIENCES IMPACT MATERNAL INTERACTIONS WITH THEIR YOUNG INFANTS

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Abstract: The interactions between infants and their mothers are experiences that have lifelong meaning for both individuals. These early relationships may serve as protective factors to adversity or they may be the source of adversity. Few studies have examined predictors of mother-infant interactions using the Adverse Childhood Experiences Scale (ACES) and the Protective and Compensatory Experiences Scale (PACES). The following study examined whether maternal adversities and protective factors in childhood are predictors of interactions with their young infants. This study collected ACES and PACES from 45 mothers and coded 10 minute free play interactions with their infants under six months of age for mind-minded commenting, coding both appropriate and non-attuned comments. Findings indicate that adversity in childhood was a significant predictor of both synchronous (β=-.12, $p<.01$) and intrusive (β = .47, $p < .05$) maternal behaviors, but was not predictive of mind-minded commenting (β= -.16, $p > .05$). When the ACE measure was broken into two subscales: household dysfunction and maltreatment, similar findings were emerged. PACES was predictive of maternal appropriate mind-minded commenting (β= .26, $p < .05$), but was not predictive of synchrony nor intrusiveness. These findings provide preliminary evidence for the impact of mothers' childhood experiences on interaction patterns with their young infants. By expanding our understanding of the impact of adversity and protective experiences on interactions between mothers and infants, interventions can be targeted to address these experiences, enhance positive interactions between mothers and infants, and change the trajectories for young children.

TABLE OF CONTENTS

LIST OF TABLES

Table Page

CHAPTER I

INTRODUCTION

Ample research to date demonstrates that mother-infant interactions are not only influential, but essential, to the healthy development of children as they grow (DiCorcia & Tronick, 2011; Hostinar & Gunnar, 2013; Carlson, 1998; Sroufe, 1997; Warren, Huston, Egeland, & Sroufe, 1997). Additionally, the impact of these early interactions persists throughout the lifespan (Calkins, 2004). Famously, Winnicott (1960) wrote in his early studies of infancy "there is no such thing as a baby, only a baby and someone else" (p. 586) suggesting that infants' experiences cannot be fully understood without taking into consideration their caregiving relationships. One of the primary caregivers for young infants is often the mother, and infants organize their behaviors toward their mothers based on the interactional patterns they have experienced with them to date. Responsiveness and availability towards their infant's cues usually results in healthy relationship behaviors. Infants are more likely to exhibit healthy attachment behaviors. For example, the infant is more likely to seek out their attachment figure to help them regulate their emotions when they become overwhelmed when exploring the world around them. When this caregiving relationship is unpredictable or filled with conflict, the infant is less likely to respond in healthy ways. The infant will be more likely to heighten their emotional response to engage their caregiver or inhibit their emotional reaction toward their caregiver to minimize the caregiver's emotional reactivity. Within an evolutionary-ethological attachment framework (Ainsworth, 1970; Ainsworth, Blehar, Waters, & Wall, 1978; Bowlby, 1969), these

exchanges between the mother and infant serve to build an internal working model (IWM) of relationships for the infant. When infants' IWM is built from relationships that have qualities of responsiveness and nurturance, it provides a foundation for future healthy emotional, social, and cognitive development. This is the optimal outcome.

However, the optimal outcome does not always occur in the context of mother-infant relationships. Seeking to understand how and why mothers interact with and parent their infants in the manner that they do is a continued area of interest to parenting researchers. Previous research demonstrates that experiencing negative relationships patterns as a child can also heavily influence maternal interactions and relationships with their own infants. Furthering our understanding of the origins of mother-infant interactions is an important step toward developing interventions that can assist when these patterns are unhealthy. Although early intervention can serve to repair early relationship disruptions, understanding how healthy foundations are created can aid in the prevention of developmental challenges before intervention is necessary. To date, research suggests a generational pattern in parenting interactions (Verhage, 2016), suggesting that approaches to both understanding and intervening in unhealthy parenting interaction patterns should involve intervention for dual generations. Research on adversity and protective experiences in childhood is helpful in explaining the generational influence of early experiences on parenting. The aim of this study is to explore the impact of adverse and protective factors in a mothers' childhood predict maternal-infant interactions patterns with their infants who are younger than six months of age.

CHAPTER II

REVIEW OF LITERATURE

Early Experiences and Parenting Practices

The study of Adverse Childhood Experiences (ACES) has begun to illuminate how experiencing adversity before the age of eighteen can negatively impact adult functioning, mental health outcomes (Chapman et al., 2004; Dube et al., 2001), and physical health outcomes (Dube et al., 2003; Leibling, 1986; Meade, Kershaw, Hansen, & Sikkema, 2009; Felitti et al., 1998). Childhood experiences such as abuse, neglect, and household dysfunction have the potential of beginning a negative trajectory that can have deleterious consequences on neurobiological development (Miller, Chen & Parker, 2009; Perry & Pollard, 1998; Shonkoff, Richter, vanderGaag, & Bhutta 2016). Although mechanisms in which these early experiences effect later physical and psychological health outcomes are currently only partially explained, it is becoming clear that they likely impact all types of adult functioning, including parenting practices (Cicchetti & Valentino, 2006; Koren-Kari, Oppenheim, & Getzler- Yosef, 2008).

Higher ACE scores have been linked to harsh parenting behaviors, such as spanking (Chung, Mathew, Rothkopf, Elo, Coyne, & Culhane, 2009). Mothers who reported two or more ACES during childhood were more likely to spank their own infant and valued corporal punishment. This likelihood increased when the mother reported a history of physical abuse in her own childhood. Additionally, Steele et al. (2016) found

that even when controlling for poverty and other risk factors, ACEs were highly correlated with self-reported parenting stress, a risk factor for abuse and neglect (Curenton, McWey, & Bolen, 2009; El-Kamary et al., 2004; Éthier, Lacharité, & Couture, 1995). Moreover, research has also documented that parents with histories of unresolved abuse and neglect have compromised capacities to respond to their infant's cues, especially in the presence of high emotionality from their infant (Vaillancourt, Pawlby, & Pasco-Fearon, 2017). These unresolved trauma histories have been linked to mothers behaving in more frightening and atypical ways towards their infants (Lyons-Ruth, Bronfman, & Parsons, 1999) that may result in mothers having a compromised ability to interpret their infants' cues appropriately, even notice the infant cues at all (Barrett & Fleming, 2011; Healy, Lewin, Butler, Vaillancourt, & Seth-Smith, 2015), and/or being able to have flexibility in their responses to their own internal needs and those of their infants (Leerkes, Parade, & Gudmundson, 2011; George & Solomon, 2008; Main, 2000). These links suggest that ACES may impact mother-child interactions.

Although the ACES literature has been instrumental in helping researchers and interventionists understand the impact of adversity in childhood, gaps in the literature still remain. More recent studies of ACEs have called for an "unpacking" of individuals' ACE scores into the two subcategories of childhood maltreatment and family dysfunction (Greeson et al., 2014). Each type of experience in childhood may have different pathways regarding how they interplay with a persons' development of perceived safety and regulatory capacities (Cichetti & Toth, 2009; Sameroff, 2000). For example, a study conducted by Narayan and colleagues (2017), looked at whether ACEs are consistent between generations in a cohort of homeless mothers and their young children. Results

indicated that higher ACE scores in the mothers predicted higher ACE scores in their young children. This was true for both subcategories of ACES. Most studies to date that have looked at ACEs in this manner have found a stronger association between childhood maltreatment and negative outcomes, such as trauma symptomology (Finkelhorr et al., 2013) and mental health issues in adulthood (Schilting, Aseltine, & Gore, 2008) than for household dysfunction.

Understanding the impact of different forms of adversity in childhood has the potential to inform interventions that can strengthen the resiliency of individuals. From the standpoint of intervention, researchers also seek to identify resiliency factors that may ameliorate possible negative outcomes associated with early adversity. This literature provides foundational evidence that positive relationships and experiences in childhood strengthen an individual's capacity to overcome childhood adversity. Several studies have observed the resilient qualities of individuals who have overcome adverse experiences. One such study followed children in Hawaii who grew up with adversities, such as poverty, low parental involvement and education, and disorganized living situations (Werner, Bierman, & French, 1971; Werner & Smith, 1992). Many of the children in this cohort developed problematic behavior and difficulties in learning. However, over one-third, did not develop poor outcomes. These individuals tended to be female, reported having support from caregivers within their family and outside of their family system, were goal oriented, and had high self esteem. Similarly, Garmezy and Tellegen (1984) found that familial support and having people who were supportive outside the family system helped to buffer the negative impact of having a parent with severe mental illness.

As described by Wright and Masten (2015), family characteristics that promote resilience include an "individual's attachment relationships; extended family and kinship ties; effective parenting in the cultural context; family rituals, values and beliefs; and financial stability" (p. 9). As documented in the attachment literature, secure attachments promote healthy development for young children, including areas of social-emotional development and cognitive development (Eisenberg, et al., 2003). The healthy development of regulatory capacities and the security to explore the environment, which occurs within the context of relationships, helps to minimize the development of later problematic externalizing and internalizing problems for children. Additionally, Dumont and colleagues (2007) and Herrenkohl and colleagues (1994) found that having stable relationships within the household served as a protective factor in situations where the child had experienced sexual abuse.

Resiliency research demonstrates that interactions within the child's world, including with caregivers and other protective experiences, matter for long term healthy development (Masten, 2013, 2014b; Panter-Brick & Leckman, 2013; Wright, Masten, & Narayan, 2013). These experiences serve as buffers to potential stressors in the environment. Lieberman and colleagues (2005) described these forces as *angels in the nursery*, "the benevolent influences that guard the course of development" (p. 506). While there is less research exploring the ways in which early resiliency factors may impact mother-child interactions, there is evidence to suggest that these experiences are salient as well. Lieberman and colleagues posit that these resiliency influences may help to protect parent-child relationships. Parents who are able to recall their own feelings of being sensitively cared for and protected are more enabled to be a source of comfort to

their own children. A newer measure, the Angels in the Nursery Interview (Van Horn, Lieberman, & Harris, 2008), seeks to quantify these experiences. A pilot study of the measure found that mothers who had been raised in foster care themselves with low *angel* scores (memories of positive caregiving experiences) and high levels of memories about childhood maltreatment experienced higher levels of Post Traumatic Stress Disorder (PTSD) symptomology (Narayan, Ghosh Ippen, Harris, & Lieberman, 2017). Moreover, for those mothers who reported higher levels of angel memories, there was not a significant effect between childhood maltreatment and PTSD symptomology. Preliminarily, these results suggest that remembering benevolent caregiving experiences may buffer against the negative impact of adverse experiences in childhood. The current study seeks to further our understanding of the influence of protective factors in childhood by exploring their link with maternal-infant interactions.

Mother-Infant Interactional Patterns

When using attachment theory as a framework, maternal-infant interactions are important processes in the understanding of infant development. In this study, mother-infant interactions patterns, such as synchrony, intrusiveness and maternal mind-minded commenting, were observed.

Synchrony. Maternal synchronous interactions occur between a mother and child and are characterized by "an observable pattern of regulated, reciprocal, and harmonious" behaviors between these two individuals (Harrist & Waugh, 2002, p. 557). Synchrony is a component of maternal sensitivity. Child development research has demonstrated that maternal sensitivity is an essential component of healthy mother-infant interactions and leads to increased regulatory capacities in young children (Spinelli & Mesman, 2018;

Crockenberg & Leerkes, 2003; Leerkes et al., 2009). However, maternal sensitivity and its relation to attachment patterns have received some criticism in the literature regarding the various ways it has been measured and defined as a construct (Verhage, et al., 2016; De Wolff & Van Ijzendoorn, 1997). Efforts to better understand the construct of sensitivity have resulted in more nuanced measurements of mother-infant interactions such as synchrony.

Tarullo and colleagues (2017) found that mothers with higher physiological expressions of stress, as measured by hair cortisol levels, displayed less synchronous interactions with their infants at six months and were determined to be more intrusive, supporting the hypothesis that mothers who are more stressed demonstrate less capacity for synchronous interactions. Using Electrocardiogram technology, Feldman and colleagues (2011) examined whether gaze, affect, and vocal synchrony, defined broadly as social contact, functioned to increase biological synchrony. They demonstrated that social contact between the infant and parent helped to achieve bio-behavioral synchrony in the dyad. They also found that the mother's heart rate adapts to the infant within one second and the synchrony with social behaviors impacted the degrees of bio-behavioral synchrony. It is of note that the synchronous actions did not necessarily involve touch so there are potentially other variables influencing the dyadic relationship.

An important implication of this research is that it appears that there are no pre-determined patterns for these dyadic interactions to occur but rather they are composed within the present moment between the parent and child. This provides further evidence of the need for finely attuned maternal responses that are flexible in nature so that the infant's social engagement is met with synchrony and the infant develops a healthy

model for how relationships work (Padron, Carlson, & Sroufe, 2014). When the infant's bids for interactions are met with synchrony, a coherent understanding is able to form for the infant. Adversities in childhood may interrupt the mothers' capacities to regulate her own emotional response and respond with flexibility during her interactions with her infant. Attachment literature supports this thinking and empirical evidence demonstrates that mothers with less empathetic responses towards their infants' emotional states respond in ways that are dismissive toward the child by avoiding the distressing event or by responding intrusively toward the infant (Cassidy, 1994; Dix, 1991; Dix, Gershoff, Meunier, & Miller, 2004; Leerkes, 2010; Leerkes, Parade, & Gudmundson, 2011).

Intrusiveness. Intrusive maternal behavior is characterized by a disregard for the infant's cues and involves ongoing stimulation from the mother, despite the child cuing the mother that she needs a break from the interaction (Kaitz & Maytal, 2005). In the short term, more maternal intrusive behaviors appear to limit the infant's ability to maintain shared attention between mothers and infants seemingly because the infant is gazing less at the mother (Galligan et al., 2018). Long term implications of maternal intrusiveness include higher rates of depression and anxiety in young children and less symbolic play (Barber, 2002). Maternal intrusiveness also appears related to poorer academic outcomes for school age children (Egeland, Pianta, & O'Brian, 1993). However, these outcomes seem to be tempered by cultural norms. For example, in cultures where controlling behaviors are more normative these parenting behaviors tend to not have the same negative impact on children (Landry et al., 2001). In cultures where more controlling behaviors are not the norm, then intrusive parenting is linked with more negative child outcomes (Lansford et al., 2004).

Fuchs, Möhler, Resch, and Kaess (2015) examined the impact of maternal history of abuse on their interactions with their infants when they were five months and 12 months of age, using the Emotional Availability Scale (EAS; Biringen at al., 1998). Mothers who reported a history of abuse scored significantly lower than the comparison group on sensitivity, structuring, nonintrusiveness, and nonhostility at both time points. Of note, for mothers with a history of abuse, no significant difference were found between the two time points on either the total score or the three subscales of the EAS, whereas significant differences were observed in the comparison group. This finding suggests that mothers who have a history of abuse might be more challenged by the infant's increase in locomotion and increased "active contact behaviors" such as the infant being able to remain in contact with the mother and increases in communication (Ainsworth, Blehar, Waters, & Wall, 1978), whereas mothers without this negative history are better able to read the infant's signals since the signals get clearer with age (Campos et al, 1992).

Additionally, Hoffenkamp and colleagues (2015) found connections between parental thought patterns and interactions between mothers and their infants. They studied links between parental perceptions of parenting and birth-related stressors measured at one month and the interactional quality between parent and child at 6 months. Previous studies by Keren et al. (2003) and Latva et al., (2008) indicated that negative experiences and perceptions postpartum are associated with later unfavorable mother-infant interactions. This study (Hoffenkamp, et al., 2015) more specifically found that in general negative and unrealistic expectations predict more unfavorable infant-parent interactions, such as less sensitivity, more intrusiveness, and more

withdrawn behaviors toward the infant. These findings were found for both mothers and fathers and these negative perceptions and distortions during the postpartum period were a better predictor of later parent-infant interactions. These results indicate that a parents' cognitions have the potential of influencing the quality of parent-child interactions. This may have implications for maternal-child interactions such as mind-minded commenting, since this type of interaction is based on the caregiver commenting in a way that signifies the infant has a mind of her own (Meins, Fernyhough, Fradley, & Tuckey, 2001).

Maternal Mind-Minded Commenting. Mind-mindedness is the disposition of mothers to talk to their infants as people with their own minds and intentions, rather than just as an object or individual whose needs they must fulfill or act upon (Meins, Fernyhough, Fradley, & Tuckey, 2001). Maternal mindedness is expressed through a specific type of commenting toward their infants in which the mother exhibits attunement to their infants' emotional state as well as their desires and preferences. Maternal mind-minded commenting has been linked to increased sensitivity and lower rates of hostility during mother-child interactions (McMahon & Meins, 2012). Seeking to examine processes related to the intergenerational transmission of attachment, Meins and colleagues (1999, 2013) called for a fine-tuning of ways to quantify sensitivity.

McMahon and Meins (2012) explored links between maternal mind-minded comments, parenting stress, and observed emotional availability. This particular study used interviews with the mother about her child to code for mind-minded comments, and then used a free play activity between the mother and child to code for emotional availability. Researchers found that parenting stress was negatively correlated with overall mental descriptors of the child and with positive mental descriptors of the child.

Mental descriptors included comments about the child's thoughts, mental capacity, interests, determination, and imagination. Mothers who exhibited high stress exhibited lower capacity to provide mental descriptors of their children. In this study, it was also found that high parenting stress was correlated with less than optimal scores for emotional availability. This suggests that parenting stress may overwhelm a parent's ability to provide mind-minded comments about their child. A direct positive relationship was also found between maternal mind-minded commenting and her sensitivity toward her infant. Mothers who used more mind-minded commenting about their infants reported less parenting stress and showed less hostility toward their infants, suggesting that their capacity for commenting on the mental state of their child was optimal when they were less stressed, which created a less antagonistic relationship with their child.

Explorations are limited regarding how mind-minded commenting is impacted by negative or protective experiences in childhood; however, attempts at understanding how trauma-exposure influences mind-minded commenting have been conducted. Easterbrooks et al. (2017) examined the moderating effects of trauma exposure and post-traumatic stress disorder (PTSD) on the impact of mind-minded commenting on child behavioral problems in a high-risk sample of adolescent mothers with 84% reporting trauma exposure. Findings indicated that for adolescent mothers who have been exposed to trauma but do not exhibit the full range of symptoms associated with PTSD mind-minded commenting is associated with fewer behavioral difficulties, as reported on the Brief Infant-Toddler Social and Emotional Assessment (BITSEA; Carter & Briggs-Gowan, 2005). However, when the mothers met criteria for full PTSD this association

ceases. Authors suggested that the symptoms of PTSD, such as hypervigilance and hyperarousal might be working against the positive attributes of mind-mindedness, making the mother "too attuned" or "too mind-minded" to the point of being intrusive with their child. These findings have implications for how to support the mother-child relationship in order to foster healthy relationships. Thus, identifying other predictors of mind-minded commenting would help researchers create a more complete picture of the factors that promote or interfere with healthy mother-child interactions. Future research that focuses on the relationship between adversity and/or protective experiences in a mothers' history and their interaction patterns with their own infants could be used to assist interventionists on ways to influence these relationships and disrupt unhealthy patterns of interaction.

In light of empirical evidence on the importance of early interactions for healthy infant development, the current study examined relationships between maternal childhood adverse and protective experiences and interaction patterns mothers have with their young infants, specifically mind-minded commenting, synchrony, and intrusiveness. Exploration of these pathways will help further our understanding of the potential intergenerational passages of trauma and inform interventionists about supporting resilience in young children.

CHAPTER III

METHODOLOGY

Site of Study

The current study uses data from the Oklahoma Baby Study-Stillwater, Wave 1 (Williamson, 2017). Data were collected from August 2015 to July 2017.

Participants

Convenience sampling was used to gather data from 45 mothers who had babies six months of age or younger. Mothers, over the age of 18, were recruited via parenting Facebook groups, flyers posted throughout the local community, and word of mouth. Interested parties filled out an inquiry form online via Qualtrics and were contacted by research assistants to explain the study, answer questions, and schedule an assessment at the Oklahoma State University Building Early Relationships lab (OSU BEaR lab). The sample included 45 mother-infant dyads who participated in the Oklahoma Baby Study-Stillwater. Maternal age range was 22-41 years (m = 29). Average infant age was 2.5 months. Ethnicity of mothers was 87% Caucasian, 7% Caucasian/Native American, 2% Caucasian/Hispanic, 2% Native American/Hispanic, and 2% Hispanic. The mothers' educational level varied (6.6% reported having a high school diploma or G.E.D., 33.4% reported some college or vocational training, 8.9% reported having an associate degree, 35.6% reported having a bachelor's degree, 8.9% reported having a master's degree, and 4.4% reported having a professional degree or PhD).

Procedures for Data Collection

After mothers completed the online inquiry form, researchers contacted them via email or by phone to schedule the approximately 90 minute appointment. Mothers brought their babies into the OSU BEaR lab on campus. Appointments were scheduled at a time that was convenient for the mother and when the infants were well rested, fed, and alert. After arrival, researchers reviewed the consent, including procedures of the assessment, protections to their information, such as assigning the mother a four-digit code to protect their anonymity, and risks and benefits of their participation. Risks were anticipated as nothing outside the realm of daily life; however, all mothers were provided a list of local counseling resources should they find any of the survey questions troubling. Mothers were compensated $40 for their participation and informed that the information provided would be utilized to enhance knowledge of child development and support ongoing improvement and programming for mothers and children. Mothers were also told that their participation was voluntary and that they could withdraw consent at any time. No mothers declined to participate, and all signed the consent.

Unless the infant was sleeping or needed to be fed, the assessment began with videotaping a five-minute speech sample where the mother was asked to talk about her relationship with her child and a 10-minute mother-infant free play activity. The mothers were provided with toys that included soft sided blocks, a squeaky toy, cloth books, plastic keys, a musical remote control and a ball. Then the mother was asked to complete a series of surveys about their own early experiences, basic demographics, parenting, mental health, beliefs about parenting, coping, cognitive functioning, emotion regulation, and their child's development. Surveys were completed online via Qualtrics in the lab.

Measures

Adverse Childhood Experiences (ACES) questionnaire. ACES (Felitti, et al., 1998) is a self-report measure of ten different adverse early experiences: (α = .79; emotional abuse, physical abuse, sexual abuse, emotional neglect, physical neglect, parental separation/divorce, domestic violence, caregiver using substance abuse, caregiver with mental illness/suicidal ideations, or caregiver being incarcerated). Respondents mark yes or no for each one. It was developed using a cohort of adults from the Kaiser Permanente managed health care group in California. This study was the first of its kind to uncover the damaging effects of the specific experiences on later health outcomes (Dube et al., 2003; Felitti et al., 1998). Questions on the ACE questionnaire were originally developed from the Conflicts Tactics Scale to define direct experiences of physical and psychological abuse and to define violence (Straus & Gelles, 1990). A survey from Wyatt (1985) was used to define childhood sexual abuse. Other questions about proximal experiences, such as mental health issues in the home and substance abuse were taken from the Behavioral Risk Factor Surveys (Siegel, et. al, 1991) and the Third National Health and Nutrition Examination Survey (Crespo, Keteyian, Heath, & Sempos, 1996), which were both conducted by the Center for Disease Control. The ACE scale assesses whether the participant experienced the 10 negative experiences prior to the age of 18. The number of "yes" responses from each respondent indicates the individual's ACE score. For this study, total ACE score was used as well as two 5-item sub-scales that assess childhood household dysfunction (α = .69; items 6-10) and childhood maltreatment (α = .68; items 1-5). In previous research using all 10 items of

the ACES questionnaire, Dong et al. (2004) reported a Cohen's Kappa (k) of 0.46 to .86 for those items coded dichotomously indicating high test-retest reliability.

Protective and Compensatory Experiences (PACES) questionnaire. PACES (Morris, Hays-Grudo, Treat, Williamson, Huffer, Zapata Roblyer, & Staton, 2015) is a self-report survey that measures ten different resiliency factors that can be experienced in childhood. These include direct and proximal protective experiences that have been shown to buffer the negative effects of adversity, such as being loved unconditionally, having a best friend, helping others, participating in sports, being active in a community group, engaging in a hobby, having another adult you trust outside of your primary caregiver, having a safe, clean home with routines and fair rules, and going to school with enough resources for you to learn. It was developed by Morris et al. (2015) in response to a need to measure experiences that contribute to resiliency in childhood in contrast to their early adverse experiences. The scale assesses whether the participant experienced the 10 protective experiences prior to the age of 18. The number of "yes" responses from each respondent indicates the individual's PACE score. In previous research, the PACES questionnaire achieved adequate reliability (Cronbach's alpha = .76). For this study, the reliability was $\alpha = .48$, but this may be due to missing data.

Dyadic synchrony and intrusiveness coding. Synchronous interactions and intrusive interactions were coded based on definitions developed by Harrist and Waugh (2002). This macro-coding system provides a global interpretation of maternal synchronous and intrusive behavior. Coders used the recordings of the 10-minute free play activity between mother and infant to code for dyadic synchrony and intrusiveness. Coders received a half-day training and coded examples with the trainer before coding

independently. Inter-rater reliability was obtained by group coding meetings where they coded the videos independently then discussed disagreements as a group (Bosler, Morris, & Silovsky, 2016). For this study, inter-rater reliability was .85 for dyadic synchrony and 1.0 for intrusiveness. According to Neuendorf (2002), an inter-rater reliability percentage of .80 or greater is considered acceptable in most coding scenarios.

Harrist and Waugh (2002) describe synchronous interactions between an infant and caregiver as "interactions between parents and their children, that involves mutual responsiveness, affect matching, and a smooth-flowing rhythm". Three components of dyadic synchrony were coded: *maintained engagement, temporal coordination*, and *contingency.* Actions on behalf of the mother include eye contact, the infant and mother attending to the same object or activity, and interactional-reciprocity within an activity. Each of these was coded on a dichotomous scale: "0" absent, indicating the mother did not engage in this type of interaction, and a "1" to indicate that the interaction of the identified behavior is observed and then summed. Thus, the total possible score for synchrony was "3", with scores ranging from "0" to "3".

Intrusiveness was measured by looking at moments when the mother was more controlling of their child's behavior. For example, when the mother did not allow the child to explore or regulate his emotions during an activity. An intrusive interaction was also characterized by being more parent-centered in the engagement than child-centered. When viewed from the child's perspective, the mother taking away toys that the infant appeared interested in or when the mother failed to reduce stimuli when the infant appears dysregulated or disinterested in an activity was characterized as intrusiveness. Actions were also labeled as intrusive when the mother's behavior did not modulate the

infant's activity, level, or pace based on the infant's activity, level, or pace. Intrusiveness was not coded if there was perceived danger and the mother intervened on behalf of the infant's safety. Intrusiveness was coded on a dichotomous scale. Thus, the possible scores for intrusiveness were "0" (not present) or "1" (present).

Mind-minded coding. Meins and Fernyhough (2015) developed an interactional coding manual for quantifying mind-minded comments during a free play session between caregiver and child. The free play coding scheme can be used in lab settings or home-based settings and operationalizes mind-mindedness as the caregiver's tendency to comment on the infant's believed internal states during face to face interactions. Mothers participating in our study were given the instruction to play with the baby as they normally would. The interaction was recorded and then transcribed verbatim. The authors of this coding manual identify comments that are to be coded as mind-minded as those that center on the child's inner thoughts, experiences, and emotions. Comments may include those that explicitly state the infant's internal state and those comments that "speak for baby". The mother's comments may include the *"desires and preferences of the infant, cognitions, emotions, epistemic states, and/or talking on the infant's behalf."* The mind-minded comments from the transcriptions were then coded a second time, while watching the recording and categorized as "appropriate" or "non-attuned". Comments identified as appropriate were those where the coder agreed with the mother's assessment of her infant's internal state. An example would be a comment of "you want the ball" and it was clear that the child was reaching or interested in the ball. Comments identified as non-attuned were those where the coder disagreed with the mother's assessment of her infant's internal state. An example would be a comment of "you want

the ball" but the child is clearly showing preference either through gaze or touch for another toy, such as a book.

The coding team participated in a one-hour training that covered the Meins and Fernyhough (2015) coding manual before beginning to code. The team coded the first five interactions together to establish consistency. They then each coded the interactions separately and regular group coding meetings were conducted to establish inter-rater reliability. The intra-class correlation was an average of .96 between the three coders. The appropriate and non-attuned coding was conducted through group coding meetings only and disagreements were discussed and noted.

Covariates. Using the demographic information from the data set, the following covariates were explored: mothers' age (in years), infants' age (in months), infant gender, and highest degree obtained by the mother. The mothers' verbosity was also assessed by calculating the total number of comments made by the mother during the 10-minute free play activity.

CHAPTER IV

RESULTS

Table 1 shows the descriptive statistics and the bivariate correlations for all variables. As anticipated, ACES and PACES were significantly negatively correlated with each other (r = -.55, $p < .001$); as were the synchrony and intrusiveness scores (r = -.62, $p < .001$). The mean score for ACES was 2.22. The maltreatment subscale mean was 0.87 and the household dysfunction mean was 1.47, demonstrating that household dysfunction was more common in this cohort than maltreatment. The PACES mean was significantly greater at 8.93, suggesting that this cohort had, on average, the majority of the resilient factors measured by PACES.

Maternal intrusiveness was significantly positively correlated with total ACES (r = .42, $p < .01$), the ACES maltreatment subscale (r = .47, $p < .01$), and the ACES household dysfunction subscale (r = .31, $p < .05$). Maternal synchrony was also significantly negatively correlated with the three different ACE scores. PACE scores were not associated with maternal intrusiveness or synchrony. ACES or PACES were not significantly related to Maternal Mind-Mindedness.

Table 2 shows the regression analyses for ACES, PACES, and Maternal-Infant interactions. Due to the binary nature of intrusiveness, logistic regressions were run for models using this variable. The other models were analyzed using linear regressions. Separate regressions were run predicting maternal-infant interactions (synchrony,

intrusiveness, and mind-minded commenting) from both maternal ACES and PACES. ACES was a significant predictor of both synchrony ($\beta = -.12$, $p < .01$) and intrusiveness ($\beta = 1.60$, $p < .05$). PACES was not a significant predictor of either. For ACES subscales of Maltreatment and Household Dysfunction, similar results were found to the regressions with the total ACE measure. Both ACES Maltreatment and ACES Household Dysfunction were predictive of maternal synchronous ($\beta = -.22$, $p < .05$; $\beta = -.15$, $p < .05$) and intrusive interactions ($\beta = 2.44$, $p < .05$; $\beta = 1.80$, $p < .05$).

Separate linear regressions were also used to predict appropriate maternal mind-minded comments from maternal ACEs and PACEs, controlling for maternal verbosity (total comments). PACES was a significant predictor of maternal Appropriate Mind-Minded comments ($\beta=1.92$, $p < .05$) but ACEs was not significantly related to mind-minded commenting. ACE subscales also did not yield any significant findings regarding mind-minded commenting.

CHAPTER V

DISCUSSION

Much of the research related to adversity in childhood has focused on its connection with risky behaviors in adulthood (Filetti et. al, 1998). Less research to date has focused on how these early experiences may impact parenting interactions between mothers and their young infants. Additionally, how early protective experiences may influence parenting is an area of research that is still emerging (Morris et al., 2017). Overall, findings from this study suggest that early experiences do influence maternal interactions with their young infants. Of particular interest is that adversity reported by mothers from their own childhoods predicted the manner in which they interacted with their own infants. Specifically, mothers with higher ACES were more intrusive during their interactions. Higher ACES was also predictive of less synchrony between the mothers and their infants. This is an important finding as it provides preliminary evidence of one potential pathway of the intergenerational impact of childhood adversity considering that intrusive parenting behaviors have been linked to children exhibiting more avoidant attachment patterns (Ainsworth et al., 1978; Carlson & Harwood, 2003; Isabella & Belsky, 1991) and increases in externalizing behavior, including aggression and mental health difficulties (Belsky, Putnam, & Crnic, 1996; Egeland et al., 1993; Gershoff, 2002; Ispa et al., 2004; Pettit, Harrist, Bates, & Dodge, 1991).

Additionally, this study took a novel approach in that adversity was divided into two categories, maltreatment and household dysfunction, with a goal of increasing our understanding of the implications of different types of adversity on maternal interactions. It was discovered that both types of adversity were predictive of less synchronous and more intrusive interactions with their young infants. It is interesting to note that the maltreatment category was a stronger significant predictor than household dysfunction in the regression models. This was similar to the results of other studies, which found that childhood maltreatment was more strongly related to internalizing and externalizing behavior in adolescents than the other negative aspects that were reported (Herrenkohl & Herrenkohl, 2007; Schilling, Aseltine, & Gore, 2008).

Findings between adversity in childhood and maternal interaction behaviors may be partially explained by research regarding ACEs and maternal depression. Granat, Gadassi, Gilboa-Schechtman, and Feldman (2017) measured synchronous behavior between mothers and their infants and the infants' emotional expressiveness and self-regulation in a low risk birth cohort of 100 mother-infant dyads. They found that depressed mothers looked at their children more frequently but for shorter durations. Additionally, their infants demonstrated lower gaze durations and their gaze aversions increased as compared to infants with non-depressed mothers. These results may suggest that infants begin withdrawing from interactions with their mothers if they are depressed and this decreased coordination between mothers and children may impact their ability to coordinate relationships later in life. This interaction pattern between the mothers and children inhibit the infants' formation of a regulatory framework in which they learn to filter negative emotions. Mothers' postpartum depression inhibits mutually regulatory

experiences between the mother and infant (Tronick, 2007), which can jeopardize the infant's ability to develop self-regulation. Additionally, ACEs are linked with depressive disorders in adulthood (Liu, 2017), although it is not known if this occurs in concert with pregnancy and early motherhood. However, several longitudinal studies have found that early adversity, such as trauma experiences, is associated with higher rates of depression chronicity (Rhebergen et al., 2012) and higher rates of depression recurrences in the adult population (Gilman et al., 2013). Thus, future research should explore further the interplay between maternal ACES and adult depression in relation to their interactions with their young infants.

In this sample, protective experiences were not predictive of maternal intrusiveness or synchrony, but were predictive of appropriate maternal mind-minded commenting. Maternal adverse experiences in childhood was not predictive of mind-minded commenting, either appropriate or non-attuned. However, the relationship between ACES and maternal mind-minded commenting is approaching significance (β = -.24, p = .06) and is an interesting finding given the small sample size. This might suggest that protective experiences in infancy impress differently than those experiences that are more adverse. This has significant implications for child outcomes. Other studies have shown that quality of interactions, as implied with mind-mindedness, are more predictive of better child outcomes than just the quantity of verbal statements made to young children (Hirsh-Pasek, 2015). In Table 3, examples of different types of mind-minded commenting are listed, including examples of those that were considered appropriate and non-attuned within this sample. There was no evidence in our sample of mothers using epistemic states, such as implying through commenting that the infant was

using teasing or playing games with the mother. This may be due to the infants in the sample being so young.

The limited findings regarding protective experiences on interaction patterns between mothers and their infants may speak to the way protective experiences were assessed in this study. The PACES questionnaire (Morris, Hays-Grudo, Treat, Williamson, Huffer, Zapata Roblyer, & Staton, 2015) is a relatively new way of looking at the ways in which childhood protective experiences may interrelate with adversity thus more research is needed to examine these relationships. One consideration is that how mothers relate to their infants has a lot to do with how they were treated when they were infants themselves (Cicchetti & Valentino, 2006; Koren-Kari, Oppenheim, & Getzler-Yosef, 2008). The PACES questionnaire measures protective experiences more related to middle childhood and beyond, such as volunteering and having a childhood best friend (see Appendix for specific questions). Thus, these experiences may not be as impactful on maternal interactions with their young infants. Another plausible explanation is that this sample lacked variability in the PACE scores and had a high Mean.

Strengths and Limitations

Despite the important findings presented in this study, there are some limitations that should be considered. Due to the longitudinal and financial restraints of observational research, the sample size was relatively small and predominately Caucasian; therefore, findings should be considered in this context and future research would benefit from considering an expanded sample. The sample was also not random, but was achieved through convenience sampling methods, such as word of mouth and posts of social media impacting the generalizability of the findings.

Methodological limitations include the retrospective nature of collecting information on adverse and protective factors in childhood, which could be flawed due to potential inaccuracies in recall and the subjectivity involved in categorizing events from childhood as adverse or protective in nature. Research in this area has generally found that adults who have experienced severe incidents of abuse tend to under report their experiences but generally do not falsely report their experiences (Shaffer, Huston, Egeland, 2008). It is generally accepted that the reported histories from adults regarding abuse in childhood can be verified (Chu, Frey, Ganzel, Matthews, 1999).

Hardt and Rutter (2004) indicate that the binary nature of such reporting of adversity in childhood, and presumably protective factors, should increase reliability. Although ACES and PACES are historically collected using yes/no responses, other researchers are expanding on ACES by asking about the nuances of their adversity in childhood, such as the severity of the incident and the number of incidents experienced (Teicher & Parigger, 2016). By using this type of measurement to analyze the impact of adversity on parental interaction, this may further explain the connection between how these early events may influence the capacities of parents to engage with their own children. Additionally, when assessing for intrusiveness between the mothers and their infants, it was assessed using a binary coding system. Although inter-rater reliability was achieved to a high degree, future research may want to consider rating systems for intrusiveness, which are continuous and incorporate individual coding of components of intrusive behaviors.

Future research should continue to explore the impact of adverse and protective experiences on maternal interactions, potentially expanding to paternal interactions as

well. The research here only begins to increase our understanding of the pathways to appropriate interactions with young infants, which is critical considering the importance of early relationships on a child's healthy development. (Cassidy, 1994), especially regarding the development of healthy regulatory capacities in children (DiCorcia & Tronick, 2011; Hostinar & Gunnar, 2013; Carlson, 1998; Sroufe, 1997; Warren, Huston, Egeland, & Sroufe, 1997). Using more advanced statistical analyses, which were unavailable given this study's sample size, has the potential to illuminate a model that may increase our knowledge-base for designing interventions to help mothers who have a more intrusive interaction pattern disrupt the cycle of negative interactions.

A future direction for intervention might be teaching mindfulness to mothers, since conceptually mind-mindedness is an orientation to mental states (McMahon & Bernier, 2017), which overlaps with other measures of mental states, like mindfulness. Campbell, Thoburn, and Leonard (2017) found that more mindfulness is associated with lower levels of parental stress, which directly corresponds to the parents' ability to be more attuned and responsive to their infant's needs. Siegel (2007) explains this relationship by describing mindfulness as a way to increase the parent's capacity to see the child in the present moment and be open to the child's own experiences, which opens the door for the child to trust and gain a sense of self (Siegel & Hartzell, 2003). Seemingly the skill of mindfulness could potentially moderate the effects of adversity and protection in childhood on mother-infant interactions.

Conclusion

Broadly, this exploratory study provides empirical evidence for adverse experiences in childhood predicting mothers' synchronous and intrusive interactions with

their young infants, and that protective experiences in childhood are predictive of mind-minded commenting from mothers. The pathways described here are preliminary but contribute to our understanding of how mothers' experiences in childhood may impact her interactions with her own infants. Furthering this line of research will benefit children by contributing to our understanding of how to increase positive interactions between mothers and their young infants and disrupt patterns of negative interactions from generational transmission.

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Table 1

Bivariate Correlations and Descriptive Statistics

	1	2	3	4	5	6	7	8	9	10	11	12	13	14
Primary Variables														
1. Total ACES	-													
2. ACES Maltreatment	.88**	-												
3. ACES Household Dysf	.93**	.66**	-											
4. Total PACES	-.55***	-.59***	-.43**	-										
5. Intrusiveness	.42**	.47**	.31*	-.25	-									
6. Dyadic Synchrony	-.42**	-.42**	-.33*	.24	-.62***	-								
7. Total Maternal MM	-.03	-.20	.01	.21	.06	.03	-							
8. Appropriate MM	-.13	-.13	-.07	.24	-.10	.05	.94***	-						
9. NonAttuned MM	-.09	.11	.10	.01	.22	-.05	.73***	.48***	-					
Demographic Variables														
10. Verbosity	.19	.09	.27	-.03	.20	-.07	.61***	.55***	.54***	-				
11. Mother Age (years)	-.07	-.07	-.09	-.01	-.22	-.09	.12	.16	-.09	.16	-			
12. Infant Age (months)	.15	.12	.15	-.13	.07	.01	-.06	-.09	.05	.12	-.24	-		
13. Infant Sex	.00	.09	-.03	.06	.16	-.04	-.05	-.12	.09	.00	.03	-.03	-	
14 Mother Education	.05	-.05	-.06	.26	-.02	-.22	.30*	.29	.18	.23	.53***	-.08	.00	-
Descriptive Statistics														
Mean	2.22	0.87	1.47	8.93	0.11	2.60	21.76	15.87	5.67	174.2	28.96	2.69	1.60	2.27
SD	2.39	1.31	1.56	1.34	0.32	0.69	12.70	10.03	4.40	48.24	4.53	1.56	0.50	1.10
Range	0 - 9	0 - 5	0 - 5	5 - 10	0 - 1	1 - 3	3 - 55	0 - 47	0 - 21	33 - 267	22 - 41	0 - 5	1 - 2	1 - 4

Note: *$p < .05$, **$p < .01$, ***$p < .001$. MM = Mind Minded Commenting. Dysf = Dysfunction.

Table 2

Linear and Logistic Regression Models

Dependent Variables	Synchrony			Intrusiveness			MM Total			MM Appropriate			MM Attuned		
	β	R^2	F	Exp β	X^2	R^2	β	R^2	F	β	R^2	F	β	R^2	F
ACES	-.42**	.15	8.92	1.60*	6.55	.27	-.16	.37	13.90	-.24	.32	11.52	-.01	.25	8.43
ACES Household Dysf	-.33*	.09	5.27	1.80*	3.90	.17	-.17	.37	14.03	-.24	.32	11.26	-.04	.25	8.49
ACES Maltreatment	-.42**	.15	8.93	2.44**	7.81	.31	-.08	.35	12.87	-.18	.30	10.31	.06	.26	8.58
PACES	.24	.04	2.67	0.62	2.37	.10	.23	.40	15.54	.26*	.33	12.00	.03	.25	8.46

Note: *$p < .05$, **$p < .01$. MM = Mind-Minded Commenting. Dysf = Dysfunction. All regressions are linear except intrusiveness, which are logistic. All MM regressions are controlled for verbosity.

Table 3

Examples of Mind-Minded Commenting

	Example from Coding Manual	Example from Sample Transcript "Appropriate"	Mapping Onto Infant Behavior	Example from Sample Transcript "Non-attuned"	Mapping Onto Infant Behavior
Desires and Preferences	Like, dislike, don't like, love, want, prefer, favorite, hate, can't stand, "are you after the ball?"	*Oooh, no you don't want that one?*	The mother held up a squeaky toy to the infant and squeaked it loudly. The infant responded by looking away from the toy.	*you love your toy!*	Mother handed the infant a toy, but the infant dropped the toy immediately and looked upward.
Cognitions	Decide, making a decision, know, recognize, remember, recall, realize, interested, not interested, notice, focused, intent, expect, working it out, fascinated, obsessed, curious, nosy	*Remember we saw owls at the zoo?*	While reading a book to the infant, that features an owl, the mother asks her baby about an event from a previous outing to the zoo.	*Did you have fun with Nana last night?*	Mother made this comment, which was seemingly unrelated to any activity that the baby was currently doing.
Emotions	Had enough, fed up, shy, solemn, self-conscious, happy, sad, scared, afraid	*You're mad at me aren't you?*	Baby begins to fuss while sitting on the mother's lap.	*Don't be sad!*	The baby is crying when the mother says this, which invalidates the infant's experience.
Epistemic	Teasing, play games with me,	No examples in this sample			
Talking on Infant's Behalf	An utterance that is obviously meant to be dialogue said/thought by the infant	*Say, but I'm really, actually, totally chill right here mom*	Before making this comment, the mother had offered to remove the baby from the bouncer. However, the baby makes no movement that would indicate actually wanting to get out of the bouncer and continues to look content bouncing in the bouncy seat.	*Say "Bye Miss A, we'll see you in a few minutes!"*	As moderator is leaving room, mother makes this comment. Although it is speaking for baby, it is not in reference to something that the baby is thinking about and is said more as a command.

APPENDICES

Adverse Childhood Experiences Measure (ACEs)

While you were growing up, during your first 18 years of life:

1. Did a parent or other adult in the household **often or very often**... Swear at you, insult you, put you down, or humiliate you? **or** Act in a way that made you afraid that you might be physically hurt?
2. Did a parent or other adult in the household **often or very often**... Push, grab, slap, or throw something at you? **Or Ever** hit you so hard that you had marks or were injured?
3. Did an adult or person at least 5 years older than you **ever**...Touch or fondle you or have you touch their body in a sexual way? Attempt or actually have oral, anal, or vaginal intercourse with you?
4. Did you **often or very often** feel that no one in your family loved you or thought you were important or special? **or** Your family didn't look out for each other, feel close to each other, or support each other?
5. Did you **often or very often** feel that you didn't have enough to eat, had to wear dirty clothes, and had no one to protect you? **or** Your parents were too drunk or high to take care of you or take you to the doctor if you needed it?

6. Were your parents **ever** separated or divorced?
7. Was your mother or stepmother **often or very often** pushed, grabbed, slapped, or had something thrown at her? **Or sometimes, often, or very often** kicked, bitten, hit with a fist, or hit with something hard? **Or ever** repeatedly hit at least a few minutes or threatened with a gun or knife?
8. Did you live with anyone who was a problem drinker or alcoholic or who used street drugs?
9. Was a household member depressed or mentally ill, or did a household member attempt suicide?
10. Did a household member go to prison?

Protective and Compensatory Experiences Measure (PACEs)

While you were growing up, during your first 18 years of life:

1. Did you have someone who loved you unconditionally (you did not doubt that they cared about you)?
2. Did you have at least one best friend (someone you could trust, had fun with)?
3. Did you do anything regularly to help others (e.g., volunteer at a hospital, nursing home, church) or do special projects in the community to help others (food drives, Habitat for Humanity)?
4. Were you regularly involved in organized sports groups (e.g., soccer, basketball, track) or other physical activity (e.g., competitive cheer, gymnastics, dance, marching band)?
5. Were you an active member of at least one civic group or a non-sport social group such as scouts, church, or youth group?
6. Did you have an engaging hobby -- an artistic or intellectual pastime either alone or in a group (e.g., chess club, debate team, musical instrument or vocal group, theater, spelling bee, or did you read a lot)?
7. Was there an adult (not your parent) you trusted and could count on when you needed help or advice (e.g., coach, teacher, minister, neighbor, relative)?
8. Was your home typically clean AND safe with enough food to eat?
9. Overall, did your schools provide the resources and academic experiences you needed to learn?
10. In your home, were there rules that were clear and fairly administered?

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Mind-Mindedness Coding Manual

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Version 2.2

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1. Introduction

Mind-mindedness (MM) refers to individuals' tendency to adopt the intentional stance (Dennett, 1987) in their interactions with and representations of others. In interactional contexts, MM has primarily been investigated in interactions between caregivers and infants, where it gives a measure of the caregiver's proclivity to treat the young child as an individual with a mind, rather than merely an entity with needs that must be satisfied (Meins, 1997). MM grew out of a rethinking of Ainsworth, Bell, and Stayton's (1971, 1974) concept of maternal sensitivity. Although Ainsworth et al.'s original characterisation of maternal sensitivity highlighted the importance of the mother responding appropriately to the child's cues, the broad-based way in which maternal sensitivity was operationalised has meant that this focus has been lost, with sensitivity becoming an umbrella concept for diverse behaviours (see Meins, 2013; Meins, Fernyhough, Fradley, & Tuckey, 2001). MM focuses on the caregiver's willingness or ability to read the child's behaviour with reference to the likely internal states that might be governing it.

Interactional measures of MM are appropriate for assessing MM with infants in the first year of life. In assessing individuals' MM in relation to older children and adults, representational measures of MM have most commonly been used. Longitudinal research has shown that the early observational measure of mind-mindedness relates to the later representational measure (Meins et al., 2003).

2. Changes Made in Version 2.0

Version 2.0 of the Mind-Mindedness Coding Manual incorporates a number of extensions and adaptations to the interview-based coding scheme, and a major change in terminology in the interaction-based coding scheme: mind-related comments

previously referred to as 'inappropriate' are now termed 'non-attuned'. This change was made in order to describe these comments using a less value-laden term, and to reflect the fact that appropriate mind-related comments and non-attuned mind-related comments are separate facets of caregiver behaviour, and have been found to be unrelated to one another in a number of samples (Arnott & Meins, 2007; Meins et al., 2001; Meins et al. 2012), leading Meins et al. (2012) to argue that mind-mindedness is a multi-dimensional construct.

3. Interactional Measures of Mind-Mindedness in The First Year of Life

MM with infants up to age 12 months is operationalised in terms of the caregiver's tendency to comment appropriately or in a non-attuned manner on the infant's putative internal states during on-line interactions. In our research, we have obtained measures of MM in the first year of life from laboratory-based observations of infant–caregiver interactions. For very young infants, it is preferable to code MM from face-to-face interactions with the child in a baby seat on a table and a mirror placed on the table so that the mother's face can be clearly seen. Face-to-face interactions of this sort should ideally last for 3 to 5 minutes. For children aged 6 months and above, MM should be coded from free play sessions where a range of age-appropriate toys is provided. We have typically used a 20-minute play session to obtain measures of MM, but shorter sessions may be used. Regardless of the age of the infant or the precise observational set-up, the caregiver is given only one instruction: *Please play with your baby as you would do if you had some free time together at home*.

Although we have used laboratory-based observations, the coding scheme would also be suitable for using in the home. The crucial issue is that the child and

caregiver are free to interact without external distractions, so for any home-based observations, researchers should ensure that friends and other family members will not be present, leaving the caregiver free to focus exclusively on the child.

In order to code MM accurately, it is crucial to be able to establish how the caregiver's comment maps onto the child's behaviour. Is the comment a response to a gesture or facial expression from the child? Is the caregiver's attention focused on the child before or while making this comment? Were the child and caregiver jointly attending to something when the comment was made? Because of the importance of these questions for the accurate coding of MM, it is essential to have the best possible view of both the caregiver and child at all times, so researchers should plan the lay-out of the observation room and the positioning of cameras very carefully. It is good to be wary of recording the interactions using a split-screen technique, since while this may enable you to see both people's faces clearly, it often makes it difficult to know precisely where the caregiver or child is looking and thus whether the caregiver's comments are in response to the child's behaviours.

Once the observation has been recorded, the interaction can then be transcribed verbatim. The level of detail included in the transcript (e.g., infant or caregiver actions) may vary depending on the extent to which researchers are interested in additional infant and caregiver behaviours, but at the very least, the transcript should include a verbatim account of everything the caregiver said during the interaction. Before coding, the lead researcher should decide how to section the caregivers' speech into individual comments. These decisions should be based on temporal (1 second pause) or semantic discontinuities. If the caregiver sings a song or recites a nursery rhyme, each line of the song or rhyme should be classed as a single

comment. Coders should receive the transcript sectioned into the agreed individual comments in order to avoid confusion over what should be classified as a comment.

3.1. Identifying Mind-Related Comments

The transcript can then be used to identify all comments which focus on the child's internal states. We have defined mind-related comments as any comment that (a) uses an explicit internal state term to comment on what *the infant* may be thinking, experiencing, or feeling; or (b) 'puts words into the infant's mouth' with the caregiver talking on the infant's behalf. Comments in the latter category do not necessarily have to contain an internal state term (although they often do), but should clearly be dialogue intended to be spoken by the infant (e.g., "That's a teddy bear, Mummy"). Although sometimes one feels that other types of comment produced by the caregiver may indicate treating the infant as an individual with a mind, in order to obtain the most valid and reliable coding scheme, only comments falling into categories (a) and (b) above are classified as mind-related.

The comments listed below are not intended to be an exhaustive list of all possible mind-related comments, but rather reflect the comments that have been observed in our research. The comments below should, however, give sufficient guidance on how different types of comment should be coded if researchers encounter different mind-related comments in their own observations.

3.1.1. Mind-Related Comments

Desires and Preferences

Like, dislike, don't like, love, want, prefer, favourite, hate, can't stand, "are you after the ball?" (in the sense of wanting to get the ball).

Cognitions

Think (but see *Non-Specific References to Infant's Internal States* in Section 3.1.3 below for "what do you think?"), decide, making a decision, know, recognise, remember, recall, realise, interested, not interested, notice, focused, intent, expect, working it out, fascinated, obsessed, curious, nosy (in the sense of being interested in or curious about something).

Emotions

Had enough, fed up, shy, solemn, self-conscious, happy, sad, scared, afraid, joyful, gleeful, full of the joys of Spring, serious, grumpy, stressed, moody, in a good/bad mood, stroppy, being difficult, worried, anxious, dazed, confused, excited, cross, not feeling yourself, startled, make you jump, surprised, disgusted, bored, angry, bad tempered.

Epistemic States

Teasing, playing games with me, joking, having a joke, playing a joke.

Talking on the Infant's Behalf

Any utterance that is obviously meant to be dialogue said/thought by the infant.

3.1.2. Comments That May or May Not be Mind-Related

Physical States

If the caregiver comments on the infant's physical state (e.g., tired, hungry, thirsty, hot, cold, etc.) in response to a behaviour from the child indicating that such a reading of their physical state is warranted (e.g., yawning or rubbing eyes to indicate tiredness, rooting or chewing hands to indicate hunger), then these comments should **not** be coded as mind-related. The caregiver may also talk about being tired or hungry

in the context of pretending to eat or sleep, and these should **not** be coded as mind-related. However, if the caregiver states that the child is tired, hungry, etc. *in the absence of any accompanying signs of such a state from the infant*, then these comments should be coded as mind-related (and will always be coded as **non-attuned** – see 3.2.2 below).

Funny/Amusing

Fun, funny, and amusing should be coded as mind-related comments if the caregiver uses these terms in response to the infant finding something fun/funny/amusing or doing something funny/amusing (as indicated by positive affect in the infant). Comments such as "that's funny/fun/amusing" that refer to other events and which impute no positive affective response to the child should **not** be coded as mind-related.

Clever

If *clever* ("you're clever", "that's clever" "clever girl/boy") is used in response to the child performing some skilful behaviour (e.g., manipulating a toy, performing a behaviour in response to a request from the caregiver) it should be coded as a mind-related comment. If *clever* is used merely to give positive feedback for generally behaving well ("clever girl/boy"), where a purely non-mentalistic interpretation is possible, it should **not** be coded as mind-related.

Cheeky

Cheeky ("you're cheeky", "that's so cheeky", "you're a cheeky boy/girl") may be mind-related if it is used in response to the child doing something that can be construed as teasing, playful, or against the instructions of the caregiver (e.g., repeatedly putting a toy in their mouth when the caregiver has moved it away and/or asked them not to, repeatedly looking at or for something when the caregiver is trying

to focus their attention elsewhere, knocking over a block tower). Note that **the child's emotional tone should be positive** in order for *cheeky* to be mind-related (e.g., the child smiling, making eye contact with the caregiver). If *cheeky* is used more generally (e.g., "cheeky boy/girl") and is not in response to any clear teasing or playful behaviour, it should **not** be coded as mind-related.

Intentions

Going to (e.g. "Are you going to play with the car?", "What are you going to do?") should **not** be coded as mind-related. *Trying to* should be classified as mind-related if the caregiver also specifies the precise goal that the child is trying to achieve (e.g., "Are you trying to get the block through the hole?"), but general uses of *trying to* (e.g., "What are you trying to do?") should **not** be coded as mind-related.

3.1.3. Comments That Are Not Mind-Related

Perception

Comments about seeing, watching, looking, listening, touching, tasting should **not** be classified as mind-related.

Saying/talking

Comments about the infant saying something or talking (made in response to vocalisations from the infant) should **not** be classified as mind-related (e.g., "Are you talking to me?", "What are you saying?"). However, if the caregiver goes on to talk on the infant's behalf and conjecture what the child might be saying, then this is coded as mind-related (see 3.1.1 above).

Non-Specific References to Infant's Internal States

Comments which indicate that the caregiver has noted a change in the infant's internal state, but do not reflect the specific state being experienced (e.g. "What's the

matter/wrong/up?", "Are you all right/OK?", "Is that better?") should **not** be classified as mind-related. Comments such as "Is that nice/good?" or "That's nice/good" should **not** be classified as mind-related. The non-specific use of *think* in the phrase "What do you think?" should **not** be coded as mind-related.

3.2. Classifying Mind-Related Comments as Appropriate/Non-Attuned

Once all mind-related comments have been identified on the verbatim transcript, they can be coded dichotomously as appropriate/non-attuned by viewing the recorded infant–caregiver interaction. We recommend that researchers coding appropriateness watch the whole of the observation session rather than fast-forwarding to each of the specific mind-related comments. It is important to have a sense of the infant's emotional state and the types of play engaged in throughout the session to aid one's judgement of the appropriateness of any specific mind-related comments produced.

Repetitions of specific internal states are counted as separate mind-related comments unless a term is repeated in rapid succession. For example, if a caregiver was observing her child playing with a toy and said, "You like that. *(1s pause)* Yes, you like that", this would be two mind-related comments. However, if the caregiver had said, "You love, love, love that", this would be one mind-related comment.

3.2.1. Criteria For Appropriate Mind-Related Comments

Mind-related comments should be coded as appropriate if any of the following criteria are met:

(a) the researcher agrees with the caregiver's reading of the infant's current internal state. For example:

a. *You want the frog* (said while infant is reaching towards the frog)

b. *The ball is your favourite thing, isn't it?* (after the infant has demonstrated a repeated preference for playing with the ball)

c. *Are you thinking?* (said while the infant has a pensive expression)

d. *You don't like that one* (after the infant has rejected a toy by pushing it away)

e. *You're fascinated by those animals* (after infant has been focused intently on playing with the animals for several minutes)

f. *You're such a happy boy* (said while infant is laughing or smiling)

g. *Are you going all shy?* (after infant coyly turns away)

h. *Did that scare you?* (after infant was startled by a noisy toy)

i. *Are you playing games with me?* (after infant has repeatedly disobeyed the caregiver's request not to put a toy in his mouth, smiling at her each time he raises the toy to his mouth)

(b) the comment links current activity with similar events in the past or future.

For example:

a. *Do you remember seeing a camel at the zoo?* (while the child plays with a toy camel)

b. *You liked going in the car today, didn't you?* (while playing with a car)

c. *Do you want to go on the train tomorrow?* (while playing with a train)

d. *You recognise this because you've got the same one at home*

e. *You like red, don't you?* (Note that comments such as these where the caregiver is drawing on the child's previous preferences over an extended period of time should be coded as appropriate even if the child hasn't obviously demonstrated a liking of red in the play session.

These are deemed appropriate because the caregiver is assumed to have previously observed such a preference in the infant and is therefore predicting that he or she will continue to like or dislike new items on this basis. However, if the infant's behaviour is obviously at odds with such a comment, then it should **not** be coded as appropriate.)

(c) the comment serves to clarify how to proceed after a lull in the interaction. For example, if the infant has been gazing around for several seconds, not focused on any particular object or event, then a comment such as *Do you want to play with the farm?* would be appropriate. Note that such a comment would be **non-attuned** if the caregiver asked this while the child was already actively engaged in attending to or playing with something else (see 3.2.2 below).

3.2.2. Criteria For Non-Attuned Mind-Related Comments

Mind-related comments should be coded as non-attuned if any of the following criteria are met:

(a) the researcher disagrees with the caregiver's reading of the infant's current internal state. For example:

a. *You're bored with that one* (referring to a toy with which the infant is still actively playing)

b. *You really like the duck* (after the infant has shown no interest in or positive affect towards the duck)

c. *Are you tired?* (after the infant has shown no overt signs of tiredness)

d. *Grumpy boy* (when the infant appears to be in a good mood)

(b) the comment refers to a past or future event that is unrelated to the infant's current activity. For example:

a. *Would you like Granny to come and see you tomorrow?* (having not previously mentioned Granny)

b. *Do you want custard for dinner?* (after no previous play or discussion focused on food)

c. *Do you want to go swimming when we go on holiday?* (after no previous play or discussion about holidays or swimming)

(c) the caregiver asks what the infant wants to do or suggests that the infant wants to become involved in a new activity when the infant is already actively engaged in playing with or attending to something else.

(d) the caregiver seems to be attributing internal states (epistemic states, emotions or desires) that are not implied by the infant's behaviour and which appear to be projections of the adult's own internal states onto the child. For example:

a. *Are you thinking about Daddy who you love so much?*

(e) the referent of the caregiver's comment is not clear. For example:

a. *You like that* (when the infant is not playing with or attending to any particular object or event)

3.3. Indices of Mind-Mindedness Used in Analyses

In our published papers on MM (e.g., Meins et al., 2001, 2012), scores for appropriate mind-related comments and non-attuned mind-related comments are expressed as a proportion of the total number of comments produced by the caregiver during the interaction in order to control for differences in verbosity. Researchers may decide that frequency measures for appropriate mind-related comments and non-attuned mind-related comments are better suited to their projects, but if frequency measures are used, then it is important to control for overall verbosity in analyses.

3.4. Adaptations For Clinical Samples

We have recently reported on MM in mothers suffering from a range of severe mental illnesses who were in a residential mother-and-baby unit (Pawlby et al., 2010). Compared with healthy controls, there was a trend for depressed mothers to achieve lower scores for appropriate mind-related comments on admission, but on discharge no difference was observed. These observations in mothers with severe mental illness have led us to suggest ways in which the MM coding scheme could be adapted for use with clinical samples.

First, it may be instructive to classify mind-related comments in terms of their emotional tone in addition to whether they are appropriate or non-attuned. For example, one of the mothers in the Pawlby et al. (2010) study commented in an irritated voice that her infant 'was just fascinated with the strap' on the baby seat, because the child continued to ignore her bids for attention while playing with the strap. Although this mother clearly recognised the focus of her child's current interest (and was thus making an appropriate mind-related comment), her irritated tone of voice implied that accurately reading her infant's mind could not help her to improve

the quality of the interaction.

Second, the discourse of mothers with severe mental illness sometimes appeared to indicate that the mother was not interacting with the infant in a way that was appropriate for his or her developmental level. Although such comments did not include references to the infant's internal states (and thus do not fall into the current MM coding scheme), they indexed mothers' inability to take the infant's perspective into account. These comments fell into two main categories: (a) requesting the infant to perform behaviours too sophisticated for his/her age (Requests), and (b) talking to the infant as if he or she was an adult or much older child (Adult Comments).

3.4.1. Requests

These comments involve the caregiver requesting the child to perform an action for her (typically, smiling, talking, holding her hand). For example, asking a 2-month-old infant to "Smile for Mummy", or a 6-month-old infant to "Say, "Teddy"" or to stand unsupported. These comments should come 'out of the blue' and not be in response to the child smiling, vocalising, etc. in the preceding few seconds.

3.4.2. Adult Comments

These comments appear appropriate to conversations between adults or between an adult and a much older child. They deal with topics about which the infant cannot have any knowledge or understanding, and have no link to the infant's current activity. For example:

(a) *Shall we make stuffed peppers for Daddy's dinner tonight?*

(b) *I had a phone call from Granny who called to see how we were getting along*

(c) *Your daddy would make sure it was all nice and safe wouldn't he?*

He'd do soldiery things

4. Representational Measures of Mind-Mindedness In Preschool and Older Children

In caregivers of children of preschool age and above, we have assessed MM using a brief interview (Meins, Fernyhough, Russell, & Clark-Carter, 1998). Caregivers are first informed that there are no right or wrong answers to the questions in the interview and that they should feel free to talk about the first things that come into their heads. The caregiver is simply given an open-ended invitation to describe the child: *Can you describe [child's name] for me?* If caregivers seek guidance on how to answer the question, the researcher should repeat that no specific type of description is required, and that the caregiver should talk about whatever comes into his/her head. When the caregiver has finished replying, s/he is asked *Can you say anything else about him/her?* [If the caregiver has already given an extensive answer in reply to the first question, this prompt can be omitted.] We usually include two further follow-up questions in the MM interview (*What's the best thing about [child's name]?* and *What do you try to teach [child's name]?*), but the answers to these questions are not analysed as part of the MM assessment.

If the MM interview is the only measure that the caregiver will be completing in the testing session, it is useful first to put the caregiver at ease by asking general questions (e.g., whether the target child has any siblings, whether they attend preschool, their precise age, etc.) before asking the caregiver to describe the child. Caregivers' answers to the *describe your child* question are transcribed verbatim, and each attribute mentioned *that refers to the child* is classified into one of the four

exhaustive and exclusive categories described below (Meins et al., 1998, 2003). Implicit descriptions **are** coded; for example, if the caregiver said 'he wears us out' without explicitly mentioning the relevant attribute (e.g., high activity level).

Note that, unlike in the observation-based MM coding scheme, precise repetitions of specific attributes mentioned during the interview are **not** coded separately, so each attribute can only be coded once. For example, if a caregiver described the child as *happy* twice in the interview, this would only be coded as one attribute, but if the caregiver described the child as *happy* and then as *content*, this would be coded as two attributes. The rationale for treating repetitions differently in the observation and interview MM schemes is that caregivers' interview-based descriptions of their children are purely representational, so repeating the same mentalistic attribute does not entail a more diverse representation of the child as an individual with a mind. In contrast, mind-related comments in the observation-based scheme are in response to the infant's behaviour, so repetitions of such comments are meaningful because they index whether the caregiver is reading the infant's internal states appropriately or in a non-attuned manner over time.

As for the observation measure, the lead researcher should decide how to section the descriptions into individual attributes. The coders should received the descriptions in sectioned format in order to avoid confusion over what should be classified as an attribute.

4.1. Mental Attributes

Any comment that refers to the child's mental life, relating to will, mind, interests, pretence, imagination, intellect, knowledge, memory, metacognition (as detailed

under Mind-related comments in Section 3.1 above). The following are also classified as mental:

(a) Wilful, opinionated, bright, intelligent, clever, mind of his/her own, well-organised, dedicated, conscientious, committed, confident

(b) Comments about the child's desires or wishes. For example:

   a. *She wants to be a teacher*

   b. *She'd like a baby brother or sister*

(c) Comments about the child's likes and dislikes. Comments about things the child likes doing are coded as mental if they involve an intellectual activity (e.g., s/he likes reading, writing, schoolwork, maths, puzzles, etc.), **but not if they involve a behavioural activity or game** (e.g., s/he he likes playing football, watching TV, swimming, X-box, etc. are coded as behavioural – see 4.3 below). For example:

   a. *He likes animals*

   b. *She doesn't like her sister playing with her stuff*

   c. *He loves schoolwork*

(d) Comments about the child's emotions, but **not** the behavioural manifestations of emotions. For example:

   a. Happy (but not 'always smiling'), loving (but not 'cuddly'), content, good sense of humour, caring, drama queen, considerate, manipulative, sensitive, thoughtful

4.2. Attributes That May or May Not Be Mental

Occasionally, it is difficult to establish whether a comment should be coded as mental or behavioural. In these circumstances, the preceding or succeeding context may assist in clarifying how the caregiver is intending the term to be used.

Helpful

If *helpful* is used in isolation, then it should be coded as behavioural (see 4.3 below). However, if the caregiver elaborates on the way in which the child is helpful to suggest that this is in response to him or her recognising other people's needs, then this should be coded as mental. For example: "When I've had a hard day and I'm really pushed for time, she's very helpful" would be coded as mental.

Funny

If *funny* is used in isolation, then it should be coded as behavioural (see 4.3 below). However, if the context shows that *funny* is being used to index the child's sense of humour rather than behaviour, then it should be coded as mental. For example: "She's really funny. She knows exactly what to say to make me laugh" would be coded as 2 mental attributes.

Cheeky

If *cheeky* is used in isolation, then it should be coded as behavioural (see 4.3 below). However, if the context shows that *cheeky* is being used to index teasing, manipulation, or wilfulness, then it should be coded as mental. For example: "He's cheeky. He remembers exactly what you've said and then uses it to argue his point" would be coded as mental 2 mental attributes.

4.3. Behavioural Attributes

Any comments that refer to the child's behaviour, such as games and activities the child is involved in, and interactions with others on a behavioural level. The following descriptions are also classified as behavioural:

Lively, talkative, chatty, boisterous, aggressive, passive, friendly, restrained, out-going, naughty, chatterbox, sporty, well/badly behaved, full of fun.

4.4. Physical Attributes

Any physical attributes, such as the child's physical appearance, age, or position in the family. For example:

(a) *He's my second son*

(b) *Blond*

(c) *Three feet tall*

(d) *He's cut all his teeth now*

4.5. General Attributes

Any comment relating to the child that does not fit into the above categories. For example: *He's a lovely little boy.*

4.6. Recent Adaptions

Research we have been conducting with foster carers and adoptive parents (Greenhow et al., 2015) has led to the introduction of two new categories for caregivers' descriptions of their children: *Self-referential* (previously used only for descriptions of adults) and *Placement.*

Self-referential: comments in which the primary reference is self-focused rather than describing the friend (e.g., "'she wears me out", "challenging", "'difficult", "loveable").

Placement: comments on the reason for the child being taken into care or placed for adoption or pre-adoption experiences (e.g., 'taken into care age 18 months', 'five foster care placements before us', 'in care for too long before adoption plan made', 'did not deserve the treatment that he had', 'birth family wanted to keep him').

4.7. Indices of Mind-Mindedness Used in Analyses

The index of MM is the score for mental attributes, calculated as a proportion of the total number of attributes produced by the caregiver during the interview in order to control for differences in verbosity (Meins et al., 1998, 2003). As before, researchers may decide that frequency measures are more appropriate, controlling for overall verbosity in analyses.

4.8. Adaptation of Describe Your Child Coding Scheme to Assess Emotional Valence

Demers, Bernier, Tarabulsy, and Provost (2010) adapted the existing scheme to assess the emotional valence of mothers' mentalistic descriptions of their 18-month-olds. They also elaborated the test question somewhat, asking: *"Generally speaking, what strikes you most about your child, how would you describe him/her?"* Demers et al. (2010) reported good inter-rater reliability for coding the emotional valence of mentalistic descriptors.

An alternative to coding the emotional valence specifically of mentalistic attributes would be to treat emotional valence as an orthogonal dimension of caregivers' descriptions of their children, coding the valence of all comments. We have not assessed valence in any of our own studies, but investigating whether caregivers represent their children in positively- or negatively-valenced ways may be a useful addition to the coding scheme, particularly for research involving clinical samples. (See Section 6 below for further adaptations that may be relevant for coding caregivers' descriptions of their children.)

5. Mind-Mindedness in Children

Representational measures of MM have recently been obtained in middle childhood. Children are invited to describe a best friend, and their responses coded as in Section 4 above. For further details see Meins et al. (2006).

6. Mind-Mindedness in Adults' Descriptions of Friends and Partners

Meins, Harris-Waller, and Lloyd (2008) adapted the 'describe your child' interview for use in questionnaire format, assessing young adults' descriptions of close friends. This procedure has also been used to assess young adults' descriptions of romantic partners, famous figures, and works of art (Meins et al., 2014). Participants provide a written description of a close friend or partner in response to the following prompt: *"Think of a person you regard as a very close friend/your current romantic partner. Please use the space below to tell us a little about this person"*. A space of seven lines was provided for each description.

The resulting text is divided into phrases or single adjectives. Two additional categories were added to Meins et al.'s (1998) coding system: self-referential comments, and relationship comments. Each phrase or adjective is placed into one of the following exclusive and exhaustive categories:

(a) *Mind-minded*: references to the emotions, mental life, and intellect of the person being described (e.g., "he's clever", "a real deep-thinker"), including references to shared mental characteristics (e.g., "we're on the same wavelength").

(b) *Behavioural*: comments about activities or interactions with others that could be interpreted on a purely behavioural level, the person's occupation (e.g., "she's a GP", "he's studying history").

(c) *Physical*: references to any physical characteristics, including age.

(d) *Self-referential*: comments in which the primary reference is self-focused rather than describing the friend (e.g., "he makes me smile").

(e) *Relationship*: comments that focus on the relationship rather than either of the individuals involved (e.g., "we are like sisters").

(f) *General*: miscellaneous comments not belonging to any of the above categories (e.g., where the person grew up, stating the person's name), including non-specific value judgements (e.g., "he's great").

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THEORETICAL FOUNDATIONS

The first few years of life are an eruption of growth and development for humans. Millions of neural connections are made in the infant's brain through interactions with the infant's caregivers and the infant's environment (Center on the Developing Child, 2009). However, these interactions are not always positive and can lead to poor outcomes for the child. In 2011-2012, 22% of children in the United States were reported as having experienced at least two events that would be classified as adverse (The Annie E. Casey Foundation, 2012), examples include children living in poverty, with parents who suffer from mental illness or who are incarcerated, have experienced the death of a parent, or are living with violence in their home or their community. Children experiencing six or more adverse childhood events in their first three years of life have a 90% likelihood of also experiencing developmental delays (Center for the Developing Child, 2009). In 2015, 40% of children that had confirmed reports of child maltreatment were under the age of 4. Adversities in early childhood have implications for the child's later development, but interventions that target strengthening early relationships have been shown to improve the lives of young children.

Attempts at understanding the influence of the parenting relationship on the health and wellbeing of infants has dominated the field of child development for decades and our mechanisms for understanding these interactional processes are increasing. Many of these mechanisms are currently understood through an evolutionary-ethological attachment framework, derived from studies conducted in the 1970's by Ainsworth and colleagues (Ainsworth, 1970; Ainsworth, Blehar, Waters, & Wall, 1978; Bowlby, 1969).

Within this theoretical framework, exchanges between the mother and infant build an internal working model of relationships for the infant. The infant organizes her behaviors toward the mother based on the mother's interactional patterns. Responsiveness and availability toward the infant's cues usually result in healthy and adaptive relationship behaviors such as balancing their need to seek out an attachment figure to regulate emotion and moving away from the attachment figure to explore the environment. However, intrusiveness and unavailability often result in the infant developing more maladaptive ways of responding in the relationship, such as stilling or limiting their emotional response or heightening negative emotion toward the caregiver.

The field of infant mental health focuses on these early relationship patterns between infants and primary caregivers and posits that the development of mental health occurs within the context of relationships and the environment. It centers on understanding and assisting when necessary with an infant's capacity to form close and secure relationships, regulate emotions, and explore the outside world (Zero to Three, 2002). Famously, Winnicott (1960) wrote in his early studies of infancy "there is no such thing as baby, only baby and someone else" (p. 586). Thus, the infant's experience cannot be fully understood without taking into consideration the child's caregiving relationships. The infant's orientation to the mother's behavior and how the mother responds is the foundation of infant mental health and the point at which intervention occurs.

Furthering our understanding of the pathways of mother-infant interactions is an important step in the promotion of solid and healthy infant mental health trajectories for our youngest citizens. The infant's internal working model (IWM) that is created during the first year of life has a lasting impact on the later relationships that will develop.

Although early intervention can serve to repair disruptions to the infant's IWM, understanding how healthy foundations are created can aid in the prevention of developmental challenges before intervention is necessary. When the infant's IWM is organized in a way that is adaptive, that foundation will support the healthy growth of other developmental functioning.

Positive and secure attachment relationships in infancy that involve responsive, sensitive caregiving styles support the development of adaptive IWMs and are linked to later positive child outcomes, such as the child showing higher self esteem, more regulatory capacity, flexibility and more ability to control impulses in preschool (Cassidy, 1994). These higher levels of regulatory capacities carry through to adolescence and more positive peer relationships (Groh et al., 2014; Elicker, Englund, & Sroufe, 1992; Shulman, Elicker, & Sroufe, 1994). In contrast, those infants who are classified as more anxiously attached to their caregivers often demonstrate less emotional control and under stress demonstrate more negative externalizing behaviors (Cassidy, 1994; Cassidy & Berlin, 1994; Sherman et al., 2013). Those infants who are classified as more avoidant show less capacity to turn toward adults to help them manage negative emotionality, are disconnected from peer relationships, and show more apathy (Cassidy, 1994; Sherman, et al., 2013). Thus, the connection between early relationship experiences and an infant's organizational patterns of emotional regulation has been well established (DiCorcia & Tronick, 2011; Hostinar & Gunnar, 2013; Carlson, 1998; Sroufe, 1997; Warren, Huston, Egeland, & Sroufe, 1997) and shown to persist throughout the lifespan (Calkins, 2004).

Given this evidence, it is imperative that child development researchers continue to identify and understand the mechanisms of healthy early interactions. One mechanism that is beginning to demonstrate significance for maternal-child interactions is the mother's capacity to view her infant as an individual, referred to in the literature as maternal mind-mindedness. Mind-mindedness is the disposition of a mother to talk to her infant as a person with his own mind and intentions, rather than just an object or individual whose needs she must fulfill (Meins, Fernyhough, Fradley, & Tuckey, 2001). Maternal mind-mindedness has been linked to increased sensitivity and lower rates of hostility during mother-child interactions (McMahon & Meins, 2012). However, little research has investigated what inhibits or promotes mind-minded commenting and the pathways of these interactive behaviors. It has been well established that early experiences contribute to a person's parenting behaviors (Cicchetti & Valentino, 2006; Koren-Kari, Oppenheim, & Getzler- Yosef, 2008), especially those surrounding the establishment or lack of establishment of healthy attachment patterns. In addition, adversity in childhood has been known to negatively influence these early relationships (Crawford & Benoit, 2009; Fonagy, Steele, Moran, Steele & Higgitt, 1993; Main & Goldwyn, 1984b, 1984a). Thus, exploring predictors of mind-mindedness such as maternal early experiences is a crucial next step.

The current study seeks to add to the existing literature on relationships between mothers and their young infants by exploring predictors of maternal mind-minded commenting with their infants and its impact on mother-infant interactional patterns. Specifically, it will explore relationships between maternal adverse and compensatory experiences and their interaction patterns with their young infants (i.e. mind-mindedness,

synchrony, and intrusiveness). The long-term goal of this research is to further our understanding of mother-child relationships and help inform interventions designed to address early relationship disruptions.

Literature Review

Mother-infant relationships are best understood within the framework of attachment theory, which provides a context for understanding the dynamics at play when a mother and infant interact with one another. In this section, an overview of the literature on attachment and its relationship to early development is discussed. Additionally, literature on adverse and compensatory childhood experiences, maternal mindfulness, and synchronous and intrusive mother-infant interactions is explored.

Theoretical foundations

Attachment theory provides the framework for the current study. Attachment theory helps to explain how a parent's early experiences may shape a mother's interactions with her own child. It emphasizes the impact of early relationships on development across the lifespan and recognizes the infant's participatory role in forming those early attachments (Bowlby, 1969). Developed by Bowlby (1958, 1969) and extended by Ainsworth (1964, 1967, 1969), attachment is described as a loving bond between two people that ties them together despite distance and persists throughout a person's life (Ainsworth & Bell, 1970). It is theorized that early in life, the function of this early attachments is protection. The infant organizes his/her behavior to gain proximity to caregivers in order to ensure survival through the safety achieved through their relationship with an older, more adept caregiver (Bowlby, 1969/1982). These early experiences with a caregiver are internalized by the infant and serve as a working model

for relationships later in life, including when the child becomes a parent herself (Main & Goldwyn, 1984).

Initial understandings of infant development did not emphasize familial interactions (Bretherton, 1992). Studies focused on the infant independently from their caregiving relationships. Psychoanalysts, like Klein (1932), focused more on the internal struggles of the child, citing struggles between the child's libido and aggressive drives as the cornerstone of emotional problems of the child. Even the early writings of Mary Ainsworth commented that the infant's love of his mother is derived from getting his physical needs met, like nourishment and did not extend much beyond that for several years (Bretherton, 1992).

However, research by Harlow (Harlow & Zimmerman, 1959) illuminated the idea that there may be external factors at work. While studying primates, Harlow uncovered external motivations of the macaque monkeys. After separating the infant monkeys from their mothers at birth, the infant monkeys were then given two types of artificial surrogate mothers: a terry cloth "mother" that provided no nourishment and a wire "mother" that provided nourishment. Repeatedly, the monkeys would cling to their terry cloth mothers and only go to the wire mother during feedings. This defied our understanding of infants at the time, which was that infant's sought out their mothers in order to fulfill their needs. Despite the nourishment, the wire mothers provided the infant monkeys, the monkeys were drawn to their terry cloth mothers for comfort.

Bowlby expanded on Harlow's work with monkeys to explain infant motivations. Bowlby was interested in the motivations behind certain infant behaviors. He postulated that the behaviors elicited by infants may be motivated by a need to gain proximity to a

person who is more adept at coping with the world due to the finding that the monkeys spent more time with the soft monkey who provided a better sense of comfort than the wire monkey who provided food but no comfort. Thus, according to Bowlby (1969/1982), behaviors that elicit proximity to an attachment figure are categorized as attachment behaviors and have evolutionary importance as a means of security, protection, and ultimately survival for the infant. Although these behaviors can be seen clearly in infancy and early childhood, they persist throughout the lifespan.

As previously mentioned, attachment theory emphasizes the impact of early relationships across the lifespan and the infant's participatory role in forming those attachments (Bowlby, 1969). These first experiences between a caregiver and infant have implications regarding the child's fears (Morgan & Riccuiti, 1969; Schaffer, 1966), separation anxiety from the primary attachment figure (Bowlby, 1960), and the infant's capacity to explore the environment around them (Ainsworth, 1967; Ainsworth & Wittig, 1969). Infants display behaviors that elicit attachments with primary caregivers from birth. Early attachment behaviors include an infant reaching, grasping, smiling, babbling, and ceasing crying when picked up by a caregiver (Bowlby, 1969). Initially these are nondiscriminatory to a particular attachment figure; however, as the infant develops, their orientation of these behaviors shifts to be more discriminatory. The signals initiated by the infant when met in a consistent, nurturing way, build a working model of relationships that support an infant's survival and later her capacity for exploring the world around her (Ainsworth & Bell, 1970).

Ainsworth expanded on Bowlby's work by offering a classification system for attachment quality between parent and infant. This was based on a lab assessment she

created called the Strange Situation (Ainsworth, Blehar, Waters & Wall, 1978). This observational assessment provides important information about attachment behaviors of infants and young children. The strange situation procedure lasts about 20 minutes and involves the infant being left alone with a stranger and then reuniting with their caregiver. Four aspects of the infant's behavior are observed during this procedure: the exploration of the infant to this new environment, the infant's behavior when the caregiver leaves the room, anxiety towards the stranger left in the room, and the behavior of the infant when the caregiver returns. Classifications are based on these four behaviors exhibited by the infant.

Infants who were classified as securely attached felt confident in their caregiver's ability to respond to their needs in a predictable, consistent way. Thus, they were able to explore the world around them and return to the caregiver in instances where they felt overwhelmed. The infant's behavior is described as "organized" and "secure" (Benoit, 2004). Insecure attachment can be classified in two ways: insecure-avoidant and insecure-resistant. Insecure-avoidant infants show physiological indicators of arousal although they may not demonstrate externalizing behaviors. They also tend to avoid or turn away from caregivers when distressed (Cassidy, 1994; Spangler & Grossman, 1993; van IJzendoorn, Schuengel, Bakermans-Kranenburg, 1999). An infant whose caregivers' respond to her bids in distressing or rejecting ways teach the infant that she cannot rely on the caregiver for safety and security. The infant, therefore, develops an organized way of responding by avoiding the caregiver (Benoit, 2004). It is described as insecure because this can lead to later problems as the infant learns that the world is untrustworthy.

Insecure-resistant infants are less exploratory than securely attached infants and demonstrate fewer coping skills and are more vulnerable to stress. They respond to the strange situation reunion by approaching their mother but ultimately pushing them away and showing greater ambivalence (Cassidy, 1994; Cassidy & Berlin, 1994). These children learn an "organized" yet insecure way of attaching when caregivers respond to their bids by being unpredictable or further escalating the child's emotional state by the unpredictable nature of their responses, instead of helping the infant return to a more regulated state. This is known as resistant attachment as the infant draws the caregiver in by extreme displays of negative emotion. Although these patterns of infant behavior are organized, as the infant is consistent in her behaviors, the insecure-resistant infants are more prone to maladjustment as they develop, especially in regards to their social-emotional development (Lyons-Ruth, Bronfman & Atwood, 1999).

Main and Solomon (1986) added a fourth classification called disorganized attachment. Infants who display a disorganized attachment have no safe haven for resolving their feelings of distress because their caregivers have shown frightening responses to their infant's bids for nurturance. Like the attachment categories of avoidant and resistant, children who display behaviors which are disorganized have a higher prevalence of psychopathology and maladaptive behaviors. The Strange Situation offered researchers an opportunity to observe the impact of primary relationships on the exploratory behaviors of infants (Ainsworth, & Bell, 1970) and opened up important discussions on the implications of the quality of attachment between parents and children.

Maternal Mind-mindedness

Maternal mind-mindness is described as distinct interpretations of the infant's mind through their discourse with the infant (Meins & Fernyhough, 1999). This construct was originally used to better understand differences in security between mothers and preschool children (Meins, Fernyhough, Russell & Clark-Carter, 1998). These researchers found that children, when assessed at age four, were more likely to pass "theory of mind" tasks, when they were identified as securely attached in infancy. The child's security classification and their later "theory of mind" capacities were related to a mother's ability to focus on the child's mental attributes or what would later be referred to as mind-mindedness.

In one study linking adult attachment characteristics with positive mind-mindedness, Demers, Bernier, Tarabulsy, and Provost (2010) demonstrated that mothers who exhibited deeper and higher rates of mind-minded comments also showed more consistency on the Adult Attachment Interview (George, Kaplan, & Main, 1985). Thus, it stands to reason that mothers who demonstrate a cohesive narrative about their own childhoods may have more capacity to attune to their own children and more accurately interpret their infants' signals (van IJzendoorn, 1995).

Research on mind-mindedness has shown that mothers exhibit more mind-minded related comments, specifically "speaking for baby", than fathers during face-to-face interactions (Lundy, 2003) and that these comments were positively correlated with increased likelihood of secure attachment. These types of comments that were related to the infant's thoughts, knowledge, and desires predicted higher attachment scores between mother and infant. Research on how mothers interact with their infants and the influence of that interaction on attachment characteristics is important, because it can help explain

pathways toward healthy attachment relationships between mothers and their children. This can also help to inform interventionists about specific ways to enhance the mother and infant relationship. However, this research does not provide information on how the propensity to interact with the infant in mind develops in the mother, especially with the information that father's interactions with the infant are significantly different. These findings have implications for how to support the mother-child relationship in order to foster healthy attachments. Thus, identifying other predictors of mind-mindedness would help researchers create a more complete picture of the barriers that interfere with healthy mother-child interactions.

Another study on mind-mindedness investigated whether pregnancy influenced later mind-minded comments between the mother and child in infancy (Arnott & Meins, 2008). Mothers and fathers were assessed for antenatal mind-mindedness in an open ended interview then, after their child was born, were asked to interact with their child. The prenatal interview and the parent-child interaction were coded for mind-mindedness. There was a positive correlation between a mother's total antenatal predictions and their mind-mindedness scores after the baby was born. Results also showed that mothers who made more comments about what their child might be like during pregnancy, instead of comments about what the child is thinking during pregnancy, were more likely to comment correctly about their child's internal states at 6 months of age. There was no correlation between a father's total antenatal predictions and their mind-mindedness scores when their infant was 6 months. This research indicates that mind-mindedness and a mother's ability to read the internal states of her child may begin in pregnancy and that formulating any ideas about the child antenatal are positively associated with reading

the child's internal states in the first few months of life. In contrast, Meins and colleagues (1998) found that it is the specific maternal mentalizing comments that predict mind-minded commenting in preschoolers.

McMahon and Meins (2012) explored links between maternal mind-minded comments, parenting stress, and observed emotional availability. This particular study used interviews with the mother about her child to code for mind-minded comments then used a free play activity between the mother and child to code for emotional availability. Researchers found that parenting stress was negatively correlated with overall mental descriptors of the child and positive mental descriptors of the child. Mental descriptors included comments about the child's thoughts, mental capacity, interests, determination, and imagination. Mothers who exhibited high stress exhibited lower capacity to provide mental descriptors of her child. In this study, it was also found that high parenting stress was correlated with less than optimal scores for emotional availability. This suggests that parenting stress may overwhelm a parent's ability to provide mind-minded comments about their child. A direct relationship was also found between maternal mind-mindedness and her sensitivity toward her infant. Mothers who used more mind-minded commenting about their infant reported less parenting stress and showed less hostility toward their infants, suggesting that their capacity for commenting on the mental state of their child was optimal when they were less stress which created a less antagonistic relationship with their child.

Early Experiences and Later Development

Adverse childhood experiences. Research on Adverse Childhood Experiences (ACES) has illuminated how early experiences of adversity, before the age of 18, impact

adult functioning, mental health outcomes (Chapman et al., 2004; Dube et al., 2001) and physical health outcomes (Dube et al., 2003; Leibling, 1986; Meade, Kershaw, Hansen, & Sikkema, 2009; Felitti et al., 1998). Significant findings of this foundational research indicate that adverse early experiences do not occur in isolation from one another but are highly correlated, are common, , and that the total number of ACES can be one indicator of cumulative stress that was experienced in a person's childhood. Although it is unclear the pathway in which these early experiences effect later physical and psychological health outcomes, it has been repeatedly shown that stressful life events before the age of 18, such as abuse, neglect, and household dysfunction have the potential of beginning a string of events that have deleterious consequences (Perry & Pollard, 1998).

It has been well documented that early experiences shape parenting practices (Cicchetti & Valentino, 2006; Koren-Kari, Oppenheim, & Getzler- Yosef, 2008). One such study by Lyons-Ruth and Jacobvitz (2008) found that parents who exhibit attachment patterns that are fraught with disorganization and fear are more likely to engage in child maltreatment and intrusive behaviors with their children. Negative attachment patterns have also been associated with decreased sensitive and responsive parenting (Haft & Slade, 1989; Slade, 2005; van IJzendoorn, 1995). Studies using the Adult Attachment Interview have also shown that parents who report their own conflicting relationships with caregivers and insecure attachments have a higher risk of having their own children with insecure and disorganized attachments (Fonagy, Steele, Moran, Steele & Higgitt, 1993; Main & Goldwyn, 1984b, 1984a). Additional studies using the Working Model of the Child Interview indicate that prenatal representations, which are negative in nature, including representations that are fearful or dissociative,

predict higher rates of intrusive behaviors towards their children and the infants are more likely to be categorized as having a disorganized attachment (Crawford & Benoit, 2009). These measures indicate a relationship between parents' own caregiving experiences influencing their current relationships with their own infants.

The ACE Study (Filletti et al., 1998) brought into focus the impact of negative early experiences, such as child abuse, child neglect, parental mental illness and parental substance abuse on the later development of poor health outcomes, risky behaviors and academic results. These early negative experiences can activate the body's stress response system (Shonkoff et al., 2012). Under normal circumstances, the body's stress response system serves to protect while supportive, sensitive adults can buffer the long-term negative effects and greatly reduce the impact to overall health and learning. However, when children cannot depend on their caregivers for this protection, the body's stress response system is activated for prolonged periods of time and the body is unable to achieve homeostatic balance. This effect can have a detrimental impact on the physical structures of the body and the body's psychological integrity. These negative experiences ultimately disrupt the body's capacity to regulate. Toxic situations, such as these, are even more damaging when they occur during the more sensitive periods of a child's development, the first five years of life, when the brain is at its most plastic (National Scientific Council on the Developing Child, 2005/2014). Moreover, elevated ACE scores are a significant risk to the internal working model of attachment relationships (Murphy, et al., 2014).

ACE scores have also been linked to parenting behaviors, such as spanking (Chung, Mathew, Rothkopf, Elo, Coyne, & Culhane, 2009). Researchers found that

mothers who reported 2 or more ACES during childhood were more likely to spank their own infant; as well as, report valuing corporal punishment. This likelihood increased when the mother reported a history of physical abuse in her own childhood. These results increase our understanding of links between early experiences, especially adverse experiences in childhood, and parenting practices. Steele et al. (2016) studied this link and found that even when controlling for poverty and other risk factors, ACEs were highly correlated with self-reported parenting stress. These results are meaningful because parenting stress has been associated with poor child outcomes, such as lack of school readiness and behavioral challenges. Thus, early experiences have the potential of impacting a parent's capacity to care for their own children.

In their study on the impact of ACEs on maternal depression, Granat, Gadassi, Gilboa-Schechtman, and Feldman (2017) measured synchronous behavior between a mother and her infant and the infant's capacity for emotional expression and self-regulation in a low risk birth cohort of 100 mother-infant dyads. They found that depressed mothers looked at their children more frequently but for shorter durations. Additionally, their infants demonstrated lower gaze durations and their gaze aversions increased. These results may suggest that infants begin withdrawing from interactions with their mother if she is depressed and this decreased coordination between the mother and child may impact their ability to coordinate relationships later in life. This lack of synchrony between the mother and child inhibits the infant's formation of a regulatory framework in which they learn to filter negative emotions. The mother's postpartum depression inhibits mutually regulatory experiences between the mother and infant (Tronick, 2007). This has implications on the infant's capacity to develop self regulation.

Additionally, ACEs have also been highly correlated with depressive disorders in adulthood (Liu, 2017). Several longitudinal studies have found that early adversity, such as trauma experiences, is associated with higher rates of depression chronicity (Rhebergen et al., 2012) and higher rates of depression recurrences in the adult population (Gilman et al., 2013).

Several studies have documented that parents who have histories of unresolved abuse and neglect have compromised capacities to respond to their infant's cues, especially in the presence of high emotionality from their infant (Vaillancourt, Pawlby, and Fearon, 2017). These unresolved traumas have been linked to mothers behaving in more frightening and atypical ways towards their infants (Lyons-Ruth, Bronfman, & Parsons, 1999). It has been postulated that mothers with unresolved histories are unable to "hold" their infant in mind due to their own internal activations (George & Solomon, 2008), which results in the mother being unable to simultaneously provide comfort to the infant's distress. This results in the mother being emotionally unavailable to their infant's needs or to reduce their infant's distress. The mother may then be compromised in her ability to interpret infant cues appropriately or see the infant's cues at all (Barrett & Fleming, 2011; Healy, Lewin, Butler, Vaillancourt, & Seth-Smith, 2015) and/or being able to have flexibility in her response to her own internal needs and those of her infant (Leerkes, Parade, & Gudmundson, 2011; George&Solomon, 2008; Main, 2000). The well established correlation between early adversity and the parent's ability to respond to her infant has implications for how ACES may impact mother-child interactions. It also has implications for how protective factors may play into how mothers interact with their

young infants, since not all parents with histories of trauma respond to their infants in ways that are maladaptive.

Protective and compensatory experiences. Resilience literature provides foundational evidence for additional positive and compensatory experiences in childhood that serve the function of strengthening an individual's capacity for adaptive responses to adversity. Masten (2014) describes resilience as a person successfully adapting after adversity or when facing significant risk factors. She also describes individuals who have successfully adapted as drawing upon personal resources, relationships, their community, and their culture that foster resilience (Wright & Masten, 2015).

Several studies have observed the resilient qualities of individuals that have overcome adverse experiences. One such study followed children in Hawaii that grew up in situations that were filled with adversities, such as poverty, low parental involvement and education, and disorganized living situations (Werner, Bierman, & French, 1971; Werner & Smith, 1992). Children in this cohort developed difficulties in their learning and problematic behavior. However, a remarkable percentage of these individuals, over one-third, did not develop poor outcomes. These individuals tended to be female, reported having support from caregivers within their family and outside of their family system, were goal oriented, and had high self esteem. Along the same line, Garmezy and Tellegen (1984) found that familial support and having people who were supportive outside the family system helped to buffer the negative impact of having a parent with severe mental illness.

As described by Wright and Masten (2015), these within family systems features that promote resiliency include an "individual's attachment relationships; extended

family and kinship ties; effective parenting in the cultural context; family rituals, values and beliefs; and financial stability" (p. 9). As illustrated in the attachment literature, secure attachments promote healthy development for young children, including areas of social-emotional development and cognitive development (Eisenberg, et al., 2003). The healthy development of regulatory capacities and the security to explore the environment, which occurs within the context of relationships, helps to minimize the development of later problematic externalizing and internalizing problems for children. Dumont and colleagues (2007) and Herrenkohl and colleagues (1994) found in their individual research that having stable relationships within the household served as a protective factor in situations where the child had experienced sexual abuse.

Wright and Masten (2015) also describe community systems that foster resilience as "having peer relationships, the presence of religious and spiritual communities, and safety in the physical environment" (p. 9). One example of the impact of peer relationships is from the work of Adams and colleagues (2011) who found that children who have negative experiences, such as family stressors, had higher levels of cortisol and decreased reports of self worth except when the individual reported having a best friend. Friendships have also been shown to be a moderator when children are in familial situations that are characterized as harsh or hostile (Schwartz et al., 2013). Without these multiple friendships, children were more likely to be victimized by peers and have other negative outcomes. Friendships have also been shown to ameliorate the effects of sexual abuse in children, such that when children feel that they have someone to confide in this helps them to resolve the emotional pain of the event and develop trust (Daigneault et al., 2007; Kia-Keating et al., 2010; Chandy et al., 1996).

Other community supports include participation in religious or spiritual organizations have been found to support resiliency. In studies involving resiliency after sexual maltreatment, the impact of this type of community group appears to stem from the group providing access to social support; as well as, the meaning being a part of such an organization provides (Hobfoll et al., 2002; Valentine and Feinauer, 1993). Participation in clubs was also found to be linked with resilience after sexual abuse (Leon et al., 2008). Additionally, Woolley and Bowen (2006) identified that adolescents experienced less psychological distress and fewer academic difficulties when they had support from adults.

Determinants of resiliency in children and adults have garnered much attention from the research community. This research has shown that interactions within the child's world, including caregivers and other protective experiences matter (Masten, 2013, 2014b; Panter-Brick & Leckman, 2013; Wright, Masten, & Narayan, 2013). These experiences serve as buffers to potential stressors in the environment. Lieberman and colleagues (2005) described these forces as *angels in the nursery*, "the benevolent influences that guard the course of development" (p. 506).

Lieberman and colleagues also posed that these benevolent influences may help to protect parent-child relationships. The parent who is able to access their own feelings of being cared for and shielded by an adult who is more adept, the very cornerstones of attachment theory (Bowlby, 1969/1982), is enabled to be a source of comfort to their own child. A new measure, the Angels in the Nursery Interview (Van Horn et al., 2008), seeks to quantify these experiences. A pilot study of the measure found that mothers who had been raised in foster care themselves with low *angel* scores, or memories of positive

caregiving experiences, and high levels of memories about childhood maltreatment experienced higher levels of Post Traumatic Stress Disorder (PTSD) symptomology (Narayan, Ghosh Ippen, Harris, & Lieberman, 2017). Moreover, for those mothers who reported higher levels of angel memories, there was not a significant effect between childhood maltreatment and PTSD symptomology. Preliminarily, these results suggest that remembering benevolent caregiving experiences buffers against the negative impact of negative experiences in childhood. This study seeks to further our understanding of the influence of protective factors in childhood by exploring their link with maternal-infant interactions.

Mother-Infant Interactional Patterns

Interactions between mothers and their infants help us to understand how attachment security, and thus insecurity, in young children develops (Ainsworth, 1973). Optimal interactions between mothers and infants promote optimal patterns of security from the infant. Optimal interactions have been described in the literature as the mother engaging in a sensitive way towards the infant (Ainsworth, Blehar, Waters, & Wall 1979), that the interaction is mutually rewarding for both mother and child (Bates, Maslin, & Frankel, 1985; NICHD Early Child Care Network, 1997), that the mother's interpretations of the infant's signals are consistent and accurate (Isabella, Belsky, and von Eye, 1989), and involve an appropriate response by the mother to these signals, especially in times of infant distress (Crockenberg, 1981; Del Carmen, Pedersen, Huffman, & Bryan, 1993). Mothers who do not respond consistently and sensitively to their infant's cues can result in the infant developing more maladaptive attachment patterns (De Wolff & van Ijzendoorn, 1997).

Early research by Ainsworth and colleagues (1978) observed that mothers, whose infant's displayed more secure behaviors at age one, engaged in interactions throughout that first year that were more responsive, affectionate, and contingent during face-to-face interactions. Later studies have replicated and expanded on these results, such that Belsky, Rovine, and Taylor (1984) found that securely attached infants experienced more responsiveness from their mothers in times of distress. Mothers of infants who displayed more optimal attachment patterns were also more likely to be affectionate towards their infants (Maslin & Bates, 1983), hold their infants more frequently, and be less likely to interrupt their child's activity (Miyake, et al., 1985).

When using attachment theory as a framework, maternal-infant interactions are important processes in the understanding of infant development. Here, literature will be presented for two constructs comprising mother-infant interactions: synchrony and intrusiveness.

Synchrony. Maternal sensitivity and its relation to attachment patterns have received some criticism in the literature regarding the various ways it has been measured and defined as a construct (De Wolff & Van Ijzendoorn, 1997). Efforts to better understand the construct of sensitivity have resulted in more nuanced measurements of mother-infant interactions. One of which is interactional synchrony. Interactional synchrony has been defined as interactions between the mother and infant, which are mutually rewarding and are reciprocal.

In an effort to understand interactional synchrony as an antecedent to attachment security, Isabella, Belsky, and von Eye (1989) observed mother-infant interactions at 1 month, 3 months, and 9 months then measured the infant's attachment security using the

Strange Situation at 12 months. Those infants displaying more secure attachment behaviors at 12 months received higher incidents of interactional synchrony at 1 month and 3 months and thus those infants with attachment behaviors that were insecure received more asynchronous interactions from their mothers at 1 and 3 months of age, but not at 9 months of age. Another important finding from this research was that specific attachment patterns were predicted by specific patterns of interactions. For example, mothers who exhibited an interactional style that was more intrusive had infants who more often displayed attachment patterns which were more insecure-avoidant, whereas mothers who exhibited an interactional style that was more detached and inconsistent had infants who displayed more attachments patterns which were more insecure-resistant. Although the authors are careful not to overgeneralize their findings based on methodological choices and small sample size, seemingly infants develop patterns of interacting with others based on their earliest experiences interacting with their mothers. This has significant implications for how attachment patterns are developed and how they might be influenced through early intervention.

In one study that measured sustained infant withdrawal behaviors based on maternal interactions, researchers compared two groups of infants who were between the ages of 7 months and 36 months (Dollberg, Feldman, Keren, & Guedeney, 2006). The control group consisted of infants and toddlers who had no known psychological symptomology and came to the study through a well-child visit, whereas the "referred" group consisted of infants and toddlers whose caregivers were seeking treatment for socioemotional difficulties, such as eating problems, sleeping problems, emotional/regulatory issues, or who had experienced a traumatic event. The infants in

the referred group had been screened and showed symptomology requiring intervention. Results of this study indicated that those who were referred for intervention demonstrated higher levels of maladaptive behavior, such as sustained withdrawal. The maternal behaviors correlated with this group were depressed mood, negative facial expressions, apathy, decreased parental efficacy, and interactions that were markedly more intrusive and lower in sensitivity. Although the high levels of troubled maternal relationships in this sample limit the generalizability, findings suggest support for the impact of maternal behaviors on an infant's maladaptive functioning. Further research focused on pathways of maternal behavior and its impact on infant functioning is needed to help infants thrive.

Another study conducted with young infants and their mothers examined whether gaze, affect, and vocal synchrony functioned to increase biological synchrony, using Electrocardiogram technology and micro-coding. Feldman and colleagues (2011) found that indeed social contact between the infant and parent helped to achieve bio-behavioral synchrony in the dyad. They also found that the mother's heart rate adapts to the infant within one second and the synchrony with social behaviors impacted the degrees of bio-behavioral synchrony. It is of note that the synchronous actions did not necessarily involve touch so there are potentially other interplays at work within the dyadic relationship.

This may have attributed to the mother's ability to attune to her infant and understand the infant's internal states. Another important implication of this research is that it appears that there are no pre-determined patterns for these dyadic interactions to occur but rather they are composed within the present moment between the parent and child. This provides further evidence of the need for finely attuned maternal responses

that are flexible in nature so that the infant's social engagement is met with synchrony and the infant develops a healthy model for how relationships work. When an infant explores contingencies in the world, including those within the dyadic interactions, they are developing a narrative around how relationships work (Padron, Carlson, & Sroufe, 2014). When the infant's bids for interactions are met with synchrony, a coherent understanding is able to form for the infant.

Maternal mind-mindedness is evidence of a type of synchrony within the dyad, because it requires the mother to be aware of the internal state of her infant and to make comments that communicate this type of understanding. Thus, shifting the mother's focus to more child-oriented goals. Attachment literature supports this thinking and there is empirical evidence that shows that mothers who demonstrate less empathetic responses towards their infant's emotional states respond in ways that are dismissive toward the child by avoiding the distressing event or by responding more intrusively toward the infant (Cassidy, 1994; Dix, 1991; Dix, Gershoff, Meunier, & Miller, 2004; Leerkes, 2010; Leerkes, Parade, & Gudmundson, 2011). The research proposed seeks to fill a gap in the research about links between maternal mind-mindedness and global synchrony sores; as well as, gaps in how this working model of the parent is influenced by early experiences since there is evidence that these models of relationship form early in a person's life.

Intrusiveness. If the mother responding contingently to a child's cues characterizes synchrony between a mother and child, then intrusive maternal behavior is characterized by a disregard for the infant's cues and involves ongoing stimulation,

despite the child cuing the mother that she needs a break from the interaction (Kaitz & Maytal, 2005).

Fuchs, Möhler, Resch, and Kaess (2015) examined the impact of maternal history of abuse on their interactions with their infants when they were five months and 12 months of age, using the Emotional Availability Scale (Biringen at al., 1998). The researchers used an experimental, longitudinal design, which was one of the first of its kind using this particular measurement with mothers who also reported a history of abuse. Mothers who reported a history of abuse scored significantly lower than the comparison group in the following areas on the Emotional Availability Scale: sensitivity, structuring, nonintrusiveness, and nonhostility at both time points. Of note, there was not a significant difference between the two times of assessment with the total Emotional Availability Score; as well as, the three subscales for the group who reported a history of abuse; whereas the comparison group did show a significant difference. These findings suggest that mothers who have a history of abuse might be more challenged by the infant's increase in locomotion and increased "active contact behaviors" such as the infant being able to remain in contact with the mother and increases in communication (Ainsworth, Blehar, Waters, & Wall, 2014), whereas mothers without this negative history are more able to read the infant's signals as the signals get clearer with age (Campos et al, 1992). Fuchs and colleagues discussed that this may indicate a potential intervention point for providers serving this population.

Hoffenkamp and colleagues (2015) studied links between parental perceptions of parenting and birth-related stressors measured at one month and the interactional quality between parent and child at 6 months. Previous studies by Keren et al. (2003) and Latva

et al., 2008) indicated that negative experiences and perceptions postpartum are associated with later unfavorable mother-infant interactions. This study (Hoffenkamp, et al., 2015) more specifically found that in general negative and unrealistic expectations predict more unfavorable infant-parent interactions, such as less sensitivity, more intrusiveness, and more withdrawn behaviors toward the infant. These findings were found for both mothers and fathers and these negative perceptions and distortions during the postpartum period were a better predictor related to later parent-infant interactions. These results indicate that a parent's cognitions have the potential of influencing the quality of parent-child interactions.

In one study on intrusive maternal behavior, Haltigan and colleagues (2014) explored relationships between a mother's dismissing and preoccupied attachment states of mind, which were measured prenatally, influence their interactions with their infants during the reunion phase of the still face procedure. The findings indicate that mothers who have a dismissing attachment framework demonstrated decreases in intrusiveness, but increases in monitoring behavior. This suggests that a mother's dismissing attachment mindset influences her need to in turn dismiss the infant's emotional response during the reunion. Those mothers with more preoccupied attachment frameworks who had infants who reacted with decreased negative affect during the face-to-face interaction was associated with higher levels of maternal intrusive behavior during the reunion. Meanwhile, when infants were distressed during the face-to-face interaction, mothers who were more preoccupied responded with withdrawal from their infants during the reunion. These findings suggest that preoccupied attachment states of mind influence the

mother's interactional style in order to maintain more negative behavioral patterns of the infant.

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Oklahoma State University Institutional Review Board

Date:	Tuesday, December 22, 2015
IRB Application No	HE1582
Proposal Title:	Oklahoma Baby Study - Stillwater
Reviewed and Processed as:	Expedited

Status Recommended by Reviewer(s): Approved Protocol Expires: 12/21/2016

Principal Investigator(s):

Amy Williamson

Stillwater, OK 74078

The IRB application referenced above has been approved. It is the judgment of the reviewers that the rights and welfare of individuals who may be asked to participate in this study will be respected, and that the research will be conducted in a manner consistent with the IRB requirements as outlined in section 45 CFR 46.

▣ The final versions of any printed recruitment, consent and assent documents bearing the IRB approval stamp are attached to this letter. These are the versions that must be used during the study.

As Principal Investigator, it is your responsibility to do the following:

1.Conduct this study exactly as it has been approved. Any modifications to the research protocol must be submitted with the appropriate signatures for IRB approval. Protocol modifications requiring approval may include changes to the title, PI advisor, funding status or sponsor, subject population composition or size, recruitment, inclusion/exclusion criteria, research site, research procedures and consent/assent process or forms
2.Submit a request for continuation if the study extends beyond the approval period. This continuation must receive IRB review and approval before the research can continue.
3.Report any adverse events to the IRB Chair promptly. Adverse events are those which are unanticipated and impact the subjects during the course of the research; and
4.Notify the IRB office in writing when your research project is complete.

Please note that approved protocols are subject to monitoring by the IRB and that the IRB office has the authority to inspect research records associated with this protocol at any time. If you have questions about the IRB procedures or need any assistance from the Board, please contact Dawnett Watkins 219 Scott Hall (phone: 405-744-5700, dawnett.watkins@okstate.edu).

Sincerely,

Hugh Crethar, Chair
Institutional Review Board

VITA

Amy Lynn Huffer

Candidate for the Degree of

Doctor of Philosophy

Thesis: EARLY PROTECTIVE AND ADVERSE EXPERIENCES IMPACT MATERNAL INTERACTIONS WITH THEIR YOUNG INFANTS

Major Field: Human Sciences

Experience:
While pursuing her social work clinical licensure, Ms. Huffer specialized in working with children under the age of 5 and is certified in a number of evidence-based interventions for this population, such as Attachment Biobehavioral Catch-up. She coordinated the state's Diagnostic Nursery where psychiatry residents/fellows evaluated children under the age of 5. She also provided early childhood mental health consultation and eventually became the state trainer for that program. After a three-year hiatus working with patients with chronic kidney disease, she served as Oklahoma's Early Childhood Trainer/Consultant where she worked to develop and strengthen the infant and early childhood workforce in Oklahoma. While completing her Doctorate at Oklahoma State University, she supported research efforts in the field of infant and early childhood mental health. Ms. Huffer has also been endorsed by the Oklahoma Association for Infant Mental Health as an Infant Mental Health Mentor and served as a past board President.

Education:
Completed the requirements for the Doctor of Philosophy in your major at Oklahoma State University, Stillwater, Oklahoma in May 11, 2018.

Completed the requirements for the Master of Social Work at University of Oklahoma, Norman, OK/United States of America in 2005.

Completed the requirements for the Bachelor of Arts in psychology at Oklahoma Norman, OK/United States of America in 2002.

Professional Memberships:
World Association for Infant Mental Health
Zero to Three
Oklahoma Association for Infant Mental Health